1913

PART II.

FOREST BRANCH.

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One of the most striking features of the past twelve months has been the remarkable increase in the volume of business handled by the Forest Branch. The inspection of over 800 logging operations, 400 sawmills, and of the 1,800 miles of active railway-construction—this, in addition to forest-protection, has meant heavy work for the field staff, which, in the early stage of organization, must be devoting constant study as well to improving its methods.

Secondly, land examination on a very considerable scale has become one of the main duties of the Branch, areas aggregating no less than 662,280 acres having been made the subject of special reports by field officers during the present year. Examinations of this nature are made for the dual purpose of protecting merchantable forest from alienation and classifying soil-values, so that settlement on unsuitable lands producing results similar to those of the abandoned farm districts of Ontario may not mar the agricultural progress of British Columbia. The general survey of timbered regions which is being made by reconnaissance parties of this Branch is also yielding valuable data concerning agricultural as well as forest lands and supplying a basis for future policy. Co-operation of the Dominion Conservation Commission in this survey has been secured.

The future readjustment of the royalty on timber has necessitated close study and investigation during the past year. Following upon the series of public hearings held in September, prolonged conferences with committees representing lumbermen of the Coast, those of the Interior, and licence-holders in general have been held with the object of formulating a definite method of regulating royalty for a period of years ahead. At the time of writing, a committee composed of auditors representing the lumbermen of the Province and representatives of the Forest Branch is conducting an inquiry at the mills in order to ascertain costs of lumber-manufacture and average selling-prices, so that full material for legislation may be submitted to the Legislative Assembly at the approaching session.

As the following report will show, great success in many lines of forest-work has been secured by the Branch in 1913. The vigorous interest in improving working methods which found its expression at the District Foresters' meeting at Victoria at the year's end is evidence that 1914 will see further improvement in forest-protection and forest-administration in British Columbia:

ORGANIZATION.

The plan of organization for the field administrative and protective force, outlined in my report for last year, was put into effect on April 1st, 1913, and the season's experience has proven it to be based on sound principles. By it, all the various lines of forest-work in a specified district, the supervision of cutting, of scaling, the collection of royalty, the collection of necessary data for timber-sales, the classification of land, the protection of forests from fire, and the construction of permanent improvements, are carried on under the direction of one man. This plan definitely fixes the responsibilities and duties of each office and eliminates unnecessary travel and duplication of work, and greatly simplifies and concentrates authority and control of the force. The result has been a much better attitude on the part of the subordinate field officers towards the work, and a decided increase in their efficiency. The establishment of permanent headquarters has also been of great assistance and help to the lumbermen, timber-owners, and others who have business relations with the Branch. A secondary result has been a decided increase in the interest and knowledge on the part of the general public in regard to the work and problems of the Branch. This interest and sympathy with the objects and purpose of forest management and protection is welcomed by all the officers of the Branch, since it is only with the support of the public that the work can succeed or advance.

The total force during summer, when, on account of the fire-protection work, it is largest, amounted to 440, of whom 35 were in the Victoria office and 405 in the field. The force in the field consisted of 11 District Foresters, 33 Forest Rangers, 27 Forest Assistants and Timber Cruisers, 18 Official Scalers, 13 Clerks and Stenographers, 159 five-months Forest Guards, 65 special short-term Forest Guards, and 62 Railway Patrolmen. The following table gives the number and class of officers by districts:—

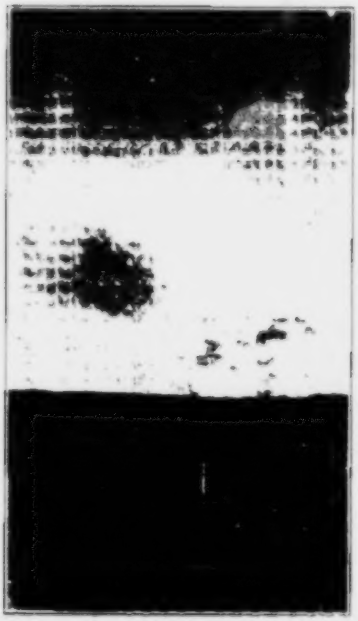
Forester on Survey Triangulation Station, Cadboro District; altitude, 7,000 feet.

Fire notice on bridge, Seton Creek, Lillooet District.

Forest Ranger's Cabin.

Erecting telephone line from Kelowna to Little White Mountain Look-out Station to give better protection to Okanagan Watershed.

Type of telephone used on Look-out Station.



Forest fire, north-west of Rose Lake, Bulkley Valley.

Fire in heavy slash, Saltspring Island.

DISTRIBUTION OF TOTAL FORCE, BRITISH COLUMBIA FOREST BRANCH, 1913.

DISTRICT.	PERMANENT FORCE.							TEMPORARY FORCE.			
	Chief Forester and Assistant Foresters.	Dist. Forester.	Clerks and Stenographers.	Fire-wardens & Cruisers.	Rangers.	Scalers.	Launch Crews.	Regular or Five-months Guards.	Special or Short-term Guards.	Railway Patrolmen.	Totals.
Cranbrook	.....	1	1	2	3	1	...	22	....	6	36
Fort George	.....	1	1	.....	5	.....	.....	18	9	11	45
Hazelton	.....	1	1	1	3	.....	.....	12	6	6	30
Island	.....	1	1	.....	3	2	1	18	8	6	40
Kamloops	.....	1	1	.....	3	.....	.....	9	9	8	31
Lillooet	.....	1	.....	.....	3	.....	.....	6	3	1	14
Nelson	.....	1	1	2	4	.....	.....	20	6	3	37
Prince Rupert	.....	1	.....	.....	2	1	2	7	2	...	15
Tete Jaune	.....	1	.....	.....	1	.....	.....	10	7	5	24
Vancouver	.....	1	6	2	4	14	9	28	13	6	83
Vernon	.....	1	1	.....	2	.....	.....	9	2	10	25
Victoria Headquarters	5	...	30	20	....	.....	5	.....	.....	.....	60
Totals.....	5	11	43	27	33	18	17	159	65	62	440

NOTE.—A number of temporary employees, as compass-men, field assistants for reconnaissance-men, etc., are not listed above. Adding them, the grand total is over 450.

The policy followed in regard to force is to maintain the permanent force required to carry on the necessary administrative work the year around, and on this as a framework to build the bulk of the fire-protection force during the summer. This plan allows the most money and the most men to be used at the time of the year they are most needed.

The permanent or winter force forms only about one-third the total summer force. During the summer one-third of the permanent force (the Rangers and launch crews) is employed chiefly in fire-protective work. Altogether in summer nearly 80 per cent. of the total force is employed in fire-protection.

The winter force of about 150 was increased to 375 during May by the addition of the regular Guards and Railway Patrolmen. During the period of extra hazard in July and August there were added sixty-five special Guards, making the total then 440.

In spite of the large increase in the force employed in 1913 as compared with the one of 1912, it is plain that the present force is inadequate to properly administer and protect from fire an area of 150,000,000 acres, and the force must be further increased. There is an especial need for more officers in the Coast and Northern Districts, which are subject to rapid settlement and development, with consequent increase in timber-sale, land classification, timber inspection and scaling, and, of course, of fire-protection work. The need for a larger force is apparent from a study of the following table, which shows the areas of the forest districts, of the Ranger and of the Guard districts:—

AREAS OF ADMINISTRATIVE AND PROTECTIVE UNITS.

Districts.	Forest Districts. Area.	Ranger Districts. Average Area.	Regular or Five-mo's Guards Dist's. Average Area.
	Acres.	Acres.	Acres.
Cranbrook	7,560,000	2,520,000	343,636
Fort George	36,630,000	7,330,000	2,036,111
Hazelton	23,100,000	7,700,000	1,925,000
Island	6,390,000	2,130,000	355,000
Kamloops	6,970,000	2,325,000	775,000
Lillooet	12,670,000	4,223,333	2,111,666
Nelson	7,950,000	1,987,500	397,500
Prince Rupert	21,880,000	10,940,000	3,125,714
Tete Jaune	5,225,000	5,225,000	522,500
Vancouver	15,770,000	3,942,500	563,214
Vernon	5,835,000	2,915,000	647,778
Total and averages	150,000,000	4,545,454	943,396

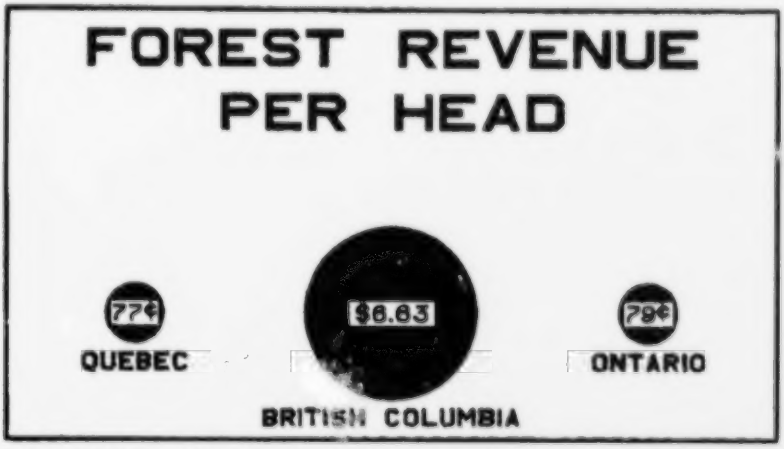
The conditions of British Columbia are not, of course, comparable with those of the forest reserves of the Western United States, where settlement and industrial development is further advanced; but it is interesting to note that the average administrative unit there is 1,200,000 acres, a Ranger district 140,000 acres, and an average patrol district 60,000 acres. The need for such an intensive system of administration and protection will not arise in British Columbia for many years, but it is needless to point out that a Ranger cannot possibly attend to the work in a district having an area of several million acres.

In the appointment of officers, only citizens of British Columbia are selected for Rangers, Forest Guards, and Field Assistants. Forest Assistants must have technical qualifications, and preference is given to British Columbians, but few have the necessary training, and it has been necessary to go to the graduates of forest schools in Eastern Canada for such officers. With the establishment of a forest school in the Provincial University, however, it will be possible to obtain all the officers required from the citizens of the Province.

The policy has been adopted, and will be adhered to, of filling administrative positions by promotion of subordinate officers who have proven their capacity, reliability, and industry. The policy applies also to the appointment of Rangers, men for this position being selected wherever possible from those who have served as Forest Guards. Only by the adoption of such a policy can an efficient and energetic organization be developed.

FOREST REVENUE.

Per head of population, the public revenue in British Columbia is the largest in Canada, being no less than three times that of the next highest Province (Manitoba), and over seven times that of Ontario. It amounts to nearly $27 per inhabitant. By far the most important item in this revenue is the portion derived from the Provincial forests. My last report showed that the Forest Branch collected $2,603,119, and that Crown-grant timber lands contributed another $150,400 during the year ending December 1st, 1912. This is far larger than Ontario's



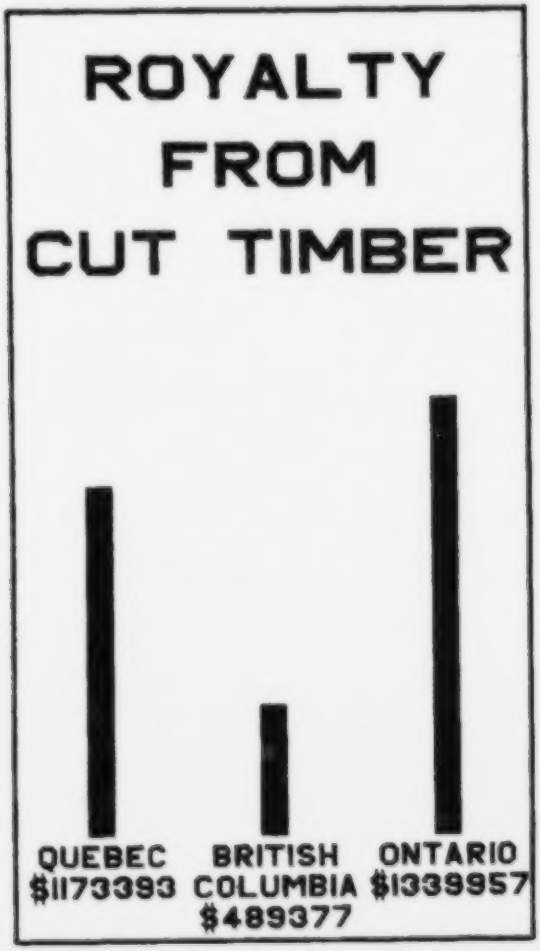
forest revenue, which nowadays is under $2,000,000. Quebec, by increasing timber rentals and royalty, has augmented her revenue to some extent, but even so her forests produce little over a $1,500,000 a year. Moreover, further comparison between the Provinces shows that, though royalty on cut timber yields over two-thirds of the forest revenues of Quebec and Ontario, yet it provides less than one-fifth in the case of British Columbia—a fact partly due to the difference in rental charges, and partly due to the comparatively undeveloped condition of our lumbering industry.

For convenience in compiling my annual report the twelve months' period ending December 1st is taken.

At the time last year's report was made it was anticipated that (even without the $140,000 in perpetuity licence fees, which had increased the revenue of 1912) the collections for 1913

would show substantial progress, due to the improved organization, larger staff, and increased activity of the Forest Branch. The financial stringency has discounted the expected receipts to some extent, but I am glad to report that, in spite of conditions in the lumbering industry, unparalleled since 1908, the Branch has been able to collect a revenue that breaks all previous records. The following shows the increase for the twelve months ending December 1st:—

1913	$2,832,788
1912	2,603,119
Increase of	$ 229,669



In the fiscal year ending next March I hope to be able to report a total revenue falling not far short of $3,000,000, partly through investigations now in progress, which are expected to release various sums held in abeyance, and partly through payment of outstanding royalties. An indication of the promptness with which business is followed up in Records Office is given by the reduction of the Trust Deposit Account, which in the past has amounted to over $700,000, to the following small total:—

Statutory deposits for timber sales	$15,263 11
Licence fees deposited to be taken to account in February	10,572 93
Awaiting executive decision on lease-rental dispute	27,599 98
Held in abeyance by survey difficulties	15,830 90
Current business	7,022 68
Total in Trust Deposit Act	$76,291 60

SPECIAL LICENCES.

The reinstatement of certain lapsed licences under the Act of last session brought the total number in existence at September, 1912, to 14,219. Expiries during the fourteen months which have elapsed since then number 191, reducing the effective total to 14,208. It should be noted that the total number of expiries since 1908 amounts to 1,098.

A comparatively small number of these licences have been dropped through the cutting out of timber, the usual reason for abandonment, so far, being more exact knowledge of the ground gained when definite survey has replaced the vague descriptions of the original stakings.

It is worthy of note, therefore, that, although the surveys of 1879 licences have been gazetted during the past twelve months, comparatively few have been allowed to expire by their holders.

The Act calls for all licences to be surveyed by 1918 at latest. Nearly 14 per cent. of the total number was dealt with this year, the surveys of 7,261 being still to be made. It may be mentioned that the average surveyed licence covers about 600 acres.

Change of ownership of licences was registered in 2,035 cases, showing approximately the same amount of business as for the previous year.

ROYALTY.

The comparative activity of the lumbering business in the different districts is shown by the diagram on the preceding page. Owing to the financial stringency the prompt collection of royalty has been rendered unusually difficult, and it is, therefore, very gratifying to be able to add that, instead of the heavy decrease that might well have resulted, the Branch, by prompt and systematic work, has actually been able to make a slight increase in its royalty collections over the previous twelve months. In addition, there are some heavy collections already in hand which were taken to account too late for inclusion in the twelve months' statement.

CROWN-GRANT TIMBER LANDS.

In addition to the amounts collected by the Forest Branch, the public revenue derived from forest sources includes the taxation levied on privately owned timber lands which are assessed at the rate of 2 per cent. on valuation. The changes in area and valuation of these lands are shown by the following table:—

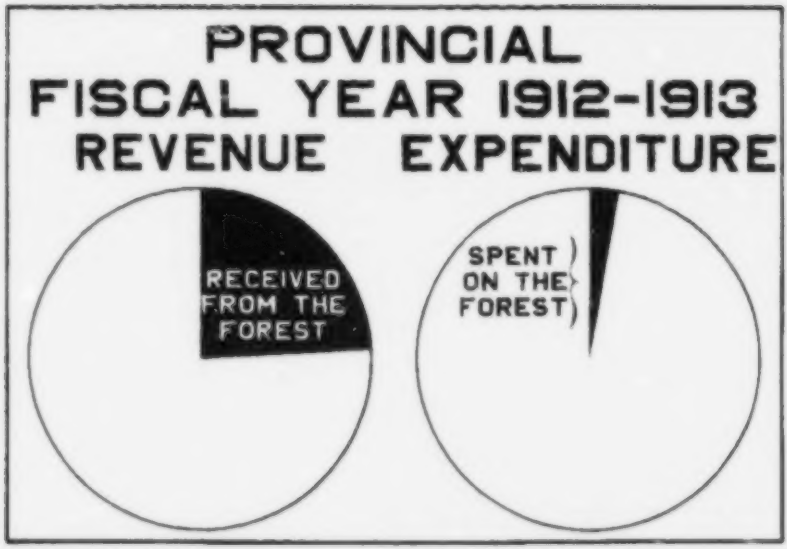
Year.	Area of Private Timber Lands.	Average Value per Acre.
	Acres.	
1911	824,814	$8 72
1912	874,715	8 60
1913	922,948*	9 02

* For total of privately held timber lands, see under "Forest Protection Fund."

The extent and value of timber land in the various assessment districts* are shown by the following table:—

District.	Acreage, 1913.	Increase or Decrease in Acreage over 1912.	Average Value per Acre.	Change in Value per Acre since 1912.
Victoria	17,341	— 247	$13 30	+0.35
Cowichan	69,109	— 5,377	14 88	+1.64
Alberni	44,733	+ 1,028	15 45	+2.15
Nanaimo	84,199	+20,446	11 05	—0.12
Comox	219,343	+34,078	12 54	—0.36
Rossland	29,385	+10,519	4 50	—0.54
Kettle River	6,041	+ 520	3 00	No change.
Slocan	31,768	—15,000	7 86	+2.58
Kamloops	4,969	No change	1 13	No change.
Vancouver	7,428	No change	15 03	No change.
Nelson	182,373	+ 4,939	3 82	+0.05
Vernon	4,692	— 127	3 06	—1.13
Golden	77,947	— 107	3 85	+0.03
Revelstoke	48,598	No change	11 47	+0.04
Fort Steele	95,031	— 1,780	6 41	+0.17
Totals	922,948	+48,233	$ 9 02	+0.42

* It should be noted that these are different from the forest districts.



DETAIL OF FOREST REVENUE.

	12 Months to December 1913.	12 Months to December 1912.
Licence rentals	$2,115,474	$1,937,194
Royalty and tax	492,649	489,377
Lease rentals	119,291	79,262
Scaling fees	25,738	36,833
Licence penalties	24,291	25,651
Timber bonus	18,720	.....
Transfer fees	10,385	11,440
Hand-loggers licences	5,025	4,125
Miscellaneous	21,215	19,237
	$2,832,788	$2,603,119
Taxation from Crown-grant timber lands	166,540	150,460
Totals	$2,999,328	$2,753,579

GENERAL EXPENDITURE.

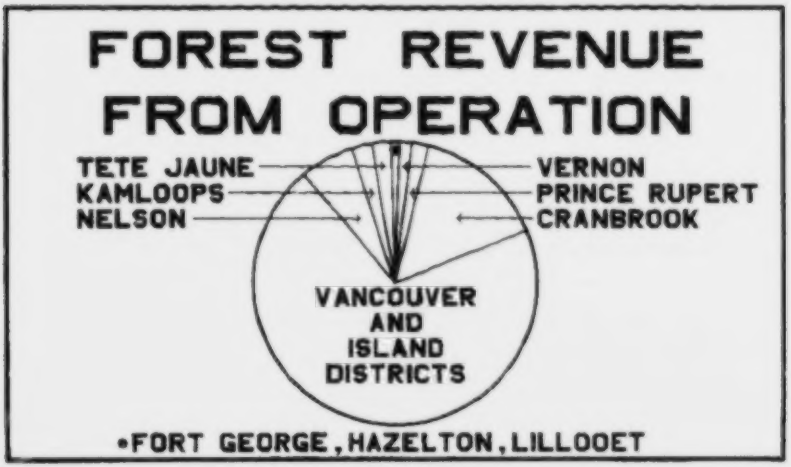
The Branch began the fiscal year, April, 1913, to March, 1914, with a vote of $149,000 for salaries, $42,000 for expenses, and $77,000 for miscellaneous expenditure, making a total of $268,000.

Against this the estimated expenditure of the Branch * for the year ending next March is as follows:—

Forest District.	General Administration.
Cranbrook	$ 9,433
Fort George	7,812
Hazelton	8,050
Carried forward	$ 25,295

* Apart from forest protection.

Forest District.	General Administration.
Brought forward	$ 25,295
Island	14,782
Kamloops	7,471
Lillooet	5,103
Nelson	10,627
Prince Rupert	10,127
Tete Jaune Cache	3,977
Vancouver	54,113
Vernon	5,216
Victoria	109,043
Total	$245,754



FOREST PROTECTION FUND.

For the present fiscal year the general statement of the fund may be estimated as follows:—

Licensees, 8,460,000 acres	$126,900	
Lessees, 945,000 acres	14,175	
Private owners, 1,669,199 acres*	25,038	
		$166,113
Equal contribution by Government		166,113
1912 refund, G.T.P.		9,747
From 1912		8,709
Total		$350,682
Salaries and expenses	$188,473	
Improvements†	88,864	
Fires	8,738	
Balance	64,627	
Total	$350,682	

* Composed as follows: As assessed on rolls, 922,948 acres; Esquimalt & Nanaimo Land Grant, 200,000 acres; B.C. Southern Tie Reserves, 543,496 acres; Timber Permit No. 15, 2,755 acres; total, 1,669,199 acres.

† *Launches.*—As the larger launches on the Coast are engaged partly in general administrative work and partly upon forest-protection, one-quarter of the expense of the big boats and two-thirds of those of the 36-foot boats are charged to the fund. The total cost of building these Coast launches was $31,800, which was apportioned on the same principle, $14,000 of the amount being included in the total shown above for permanent improvements, and $7,000 under general administration, the balance having been paid in the previous year.

By districts the estimated expenditure of the fund is as follows:—

Forest District.	Salaries and Expenses.	Permanent Improvements.	Fires.	Totals.
Cranbrook	$ 20,351	$ 8,084	$ 865	$ 29,300
Fort George	25,765	7,141	1,785	34,691
Hazelton	12,632	1,340	7	13,999
Island	18,793	4,900	938	24,631
Kamloops	16,246	11,000	503	27,749
Lillooet	9,729	502	84	10,315
Nelson	17,640	15,874	1,760	35,274
Prince Rupert	5,637	....	68	5,705
Tete Jaune Cache	11,916	6,150	1,469	19,535
Vancouver	32,958	13,167	297	46,422
Vernon	14,862	6,706	962	22,530
General	1,904	14,000	....	15,904
	$188,473	$88,864	$8,738	$286,055

RECORDS OFFICE.

The Records Office is divided into five sections, dealing respectively with Accounts, Status matters, Draughting, Files and Property, and Atlas.

In the section of Accounts the prompt dispatch of business and the immediate mailing of receipts for all payments made to the Branch is made the guiding principle. An extremely effective follow-up system ensures persistent attention to accounts in arrears and to matters needing action at a later date, thus preventing any accumulation or neglect of work. The monthly statements of revenue, of any arrears that may be owing to the Branch, and of both administrative and forest-protection expenditure enable the work and policy of the Branch to be closely watched throughout the year.

One of the first duties of the Accounts section this year was the preparation and issue of fiscal regulations governing the expenditure of money by the district officers and by individual members of the Branch. By the enforcement of these regulations the audit of accounts by the Victoria office has been greatly simplified. Card systems are used in connection with this audit; each account, whether that of a person, launch, office, permanent improvement, or other project, being analysed, thus revealing at a glance any unusual feature in expenditure, and rendering duplication of payment impossible. A card record is also kept for all persons having Government property in their charge, while another system of cards is maintained to show the disposition of each separate kind of property. Card systems are also maintained in order to supply information (needed alike by the Forest, Survey, and Land Branches of the Department) concerning the changes in standing or ownership which are taking place from day to day in the standing of timber licences and leases. These various records are kept absolutely up-to-date, and by putting the business of the Branch on an exact footing they have proved most effective in promoting economy in expenditure, in preventing illegal cutting of Crown timber, and in giving the business public prompt service. Suggestions for improvements are constantly being considered, the idea being to apply the most effective principles of the business world to official matters.

The establishment of local offices and the appointment of a permanent staff in each of the eleven forest districts of the Province threw upon the Status section of the Victoria office the duty of equipping this force with the records needed for effective field-work, and consequently a very large amount of clerical work had to be completed with as little delay as possible.

To begin with, extracts had to be made from the registers of the Lands Department so as to supply each district office with the date and nature of every alienation of land. Without this information the field force would have been unable to supervise logging operations, check

trespass, control the export from the Province of unmanufactured material, and ascertain the correct rates of royalty to be paid in each operation. As there are some ten different classes of timber, and as several of these classes of timber may be mixed together in one logging operation, field officers consequently need the most up-to-date information.

The next matter to receive attention was the compiling of a timber-licence record giving full particulars of each licence and of its standing and survey. The original record was made on linen, and the district offices supplied with blue-print copies bound in volumes. As there are over 14,000 licences, this involved the making of no less than 5,000 blue-prints.

At the session of the Legislature in 1912 the Act was amended to enable the Branch to introduce a definite system of timber-marks, and to require the owners of the old-fashioned marks to reregister and tie these marks down to definite areas of timber. The whole revenue derived from royalty and timber bonus depends upon the correct marking of logs, which made this matter one of great importance. An investigation into the timber-mark registers, which the Status section then undertook, resulted in the cancellation of some 300 unsuitable or disused marks, only a few old trade-marks which had become well known in the lumbering business being allowed to remain on the registers to meet the convenience of operators. This revision made possible (for the first time) the printing and issue of a correct list of officially registered marks containing full information concerning the land on which each mark is to be used, as well as supplying field officers with the status of all surrounding lands. With this in his pocket, a field officer inspecting a logging operation has in tabloid form the complete land records of the Province to assist him in his work. The list is kept constantly up-to-date by means of supplements, and is frequently reprinted—the type being left standing on account of the intricate printing involved. To show the amount of labour involved in its preparation, I may mention that some fourteen people were engaged for about two months on the first issue of the publication. The considerable number of marks effective at the present moment throws a sidelight on the progress of the logging business of the Province:—

On old Crown grants (1-cent tax)	45 marks.
On exportable Crown grants, 1887-1906	95 "
On non-exportable Crown grants and pre-emption records, 1906 and later	161 "
On timber licences	51 "
On timber leases	30 "
On Indian reserves and Dominion timber	16 "
On hand-logger operations	221 "
Timber-sales	15 "

The large number of cases in which the field force examine timber on land included in applications to purchase or pre-empt; the examination of over 1,000 expired timber licences and leases; the making of timber-sales; issue of railway permits, hand-logger licences, and timber-marks—all these create a heavy volume of current work for the Status section. Since office delays may cause heavy expense through loss of time by field parties and launch crews, special effort is made to supply quickly the status information on which the field examinations are based.

The standing of lands referred to in royalty accounts, reports on logging operations, and returns showing statutory timber land obtained by the reconnaissance parties all need careful checking; and, finally, the issue of a weekly bulletin keeps other branches of the Department and the district forest offices informed of the changes taking place from day to day in the standing of licences, leases, hand-logger licences, and timber-marks, and thus prevents trespass and other irregular cutting of Crown timber. The close attention given to this work has had important results, new assets of the Crown in the form of stumpage liable to royalty having been placed on record to the extent of over $500,000 during the past year.

Attention is drawn to the excellent effect produced by a visit of the official in charge of the Status section at Victoria to field parties examining lands up-coast, a far more intimate co-operation being thus obtained between office and fieldmen.

The supplying of material for field parties has involved heavy work in the Draughting section, which has also to deal with reconnaissance material and the plotting of forest-protection and grazing maps. On the other hand, the installation of an electric tracing-table has enabled

MILLS AND LOGGING MAP

DRAWN BY GEOGRAPHIC BRANCH, SURVEYOR-GENERAL'S OFFICE

the draughtsmen to trace at about nine times their former speed, and the facilities for blueprinting that will soon be provided in the Survey Branch will still further quicken the output of material required by the fieldmen.

One of the most important improvements in the Records Office during the past year has been the establishment of the Forest Atlas. In volumes of convenient size, this contains blueprints of the Province on which all expired licences, leases, and other lands with which the Branch is concerned are shown, as well as the results of every land examination. The locations of timber-sales, railway permits, mill-sites, grazing-areas, and all other lands dealt with in any way by the Branch are also marked out, so that each sheet of the atlas gives at a glance both a summary and an analysis of the Branch's activities. Duplication of field-work is thus avoided; and the cost of land examination is considerably reduced, since before sending a party to any locality on a particular errand all work in that locality can be ascertained by the headquarters office from the atlas, and one examination trip be made to serve where several would otherwise be required. The accumulated results of the past eighteen months have not yet been fully entered, but shortly after the New Year the atlas will have been brought entirely up-to-date.

The Files and Property section is concerned first of all with the handling of correspondence. A letter-book record for incoming mail dealing with money matters is maintained, but with this exception an automatic subject filing system is used. This latter saves the labour of indexing, and allows each morning's letters to be received and dealt with in the different offices at once, doing away with the delay caused by the letter-book method. Prompt action usually means economy in forest-work where launch upkeep and other transportation expenses are heavy, and it is very obvious that the saving of office-time between 9 a.m. and 11 a.m. has proved a valuable improvement. For so young an organization the correspondence of the Branch has been large, over 20,000 letters having been received in the year and nearly 30,000 having been sent out; the incoming mail being already two-thirds the size of that of the main Department.

For the care of property there is maintained a simple system of transfer receipts, which tie down the responsibility for every article of property to the member of the Branch in whose custody it has been placed. The obtaining of headquarters supplies and their distribution to the districts; the multigraphing of circulars, form letters, and office material; the maintenance of a classified mailing-list and the library of the Branch, with the care of the publicity material (now recognized as the most effective means of preventing forest fires)—these are other matters of current work. Finally, there is the filing and cataloguing of photographs taken by the field staff to show the various forest types found in the Province, or to illustrate lumbering operations, slash conditions, grazing regions, the construction of permanent improvements for forest protection, and the many other phases of forest administration.

IMPORTANCE OF THE LUMBERING INDUSTRY.

Even to-day, with the sea-going export trade in lumber still in its infancy and the available market for British Columbia timber practically confined to the Prairie Provinces of Canada, the lumbering industry constitutes the commercial backbone of our forest Province. The census returns show that half our industrial capital is invested in the lumbering and wood-working business; that half the pay-roll of the Province is derived from our forests; and that 37 per cent. of our annual production of wealth comes from that same source. In district after district, moreover, logging operations have been the first agency through which agricultural settlement has been achieved. They attract labour to vacant regions of the Province; cause the development of new transportation routes; open up hitherto inaccessible forest-areas, and provide a local market for the produce of the settler who follows in their wake.

Important as is the part played by our lumbering industry to-day, it is obvious, in view of the immense timber resources of the Province, that its development is still upon a comparatively small scale. Outside the Prairie Provinces it has practically no effective markets. Its cargo trade in 1912 was under 52,000,000 feet. The whole shipment to the east of Canada is confined to a few specialties, such as dimension timber and small quantities of high-grade material; and but a thin trickle of business in shingles and high grades has been possible with the United States. Chaotic overproduction has resulted from this shortage of markets, since the quality and quantity and accessibility of our Provincial forests have proved an overwhelming temptation to lumbermen to enlarge their mill capacity beyond current needs. Through a combination of

circumstances even the near future may be expected to see a very great improvement in the conditions of the industry. Whatever differences of opinion there may be as to the exact commercial effects of the opening of the Panama Canal, it is beyond dispute that a general broadening of our markets for lumber will result. Sooner or later, moreover, the western freight-rates question must be decided in favour of the West. Panama in itself will attract shipping and make British Columbia more of a distributing centre for Western Canada, a position that will, of course, be immensely strengthened by any equalization of the rail-haul rates east and west. With plenty of shipping requiring outward cargoes, definite encouragement will be created for the export of lumber to Australia, South America, South Africa, and the Orient, as well as to Atlantic ports, while the removal of tariff restrictions upon lumber from this Province entering the United States should afford further, though, of course, less pronounced, relief of the present congestion of output.

In the collection of forest revenue the returns of the Forest Branch show a cut of 1,457,000,000 feet, board measure, for the year 1913, an amount which is nearly equal to the combined output of the Provinces of Ontario and Quebec for the previous year. If the large amount of material used in railway-construction during the year be included, British Columbia's total cut would approach 2,000,000,000 feet. The number of saw and shingle mills exceeds 425.

Considerable attention has been devoted by the Government to the encouragement of the pulp and paper industry. As was inevitable, the commercial development of this business and its successful operation in competition with competitors who previously monopolized the existing markets has been attended with considerable difficulty. The mammoth plant at Powell River, however, with its daily output of 225 tons of paper, is a monument to commercial enterprise and Government policy, the prosperous little town which has come into existence in connection with this plant constituting a new outpost of white settlement on the vast stretch of the Provincial coast-line.

The B.C. Sulphite Fibre Company's mill on Howe Sound, with a daily output of 40 tons of the highest quality of sulphite fibre produced in Canada, is another landmark of industrial progress. Its product competes successfully with that of the oldest-established European mills.

LOGGING INSPECTION.

There were 794 logging operations in progress during 1913 on timber lands on which a royalty or tax had been reserved to the Crown. The product of these operations for the calendar year 1913 was, approximately, 1,348,000,000 feet of logs, 82,805 cords of shingle-bolts, 3,030,010 lineal feet of piling, 35,000 mining-props, 15,500 cedar posts, and 5,093,718 lineal feet of cedar poles. The loggers of British Columbia in 1913 established a new record both for number of camps operated and quantity of timber produced. The output would have been much greater had it not been for the depression in lumber-production which seriously affected the output of the camps during the latter six months of the year. In point of number the logging camps of the Province are about equally distributed between the Coast districts, where all operations are conducted by steam and the camps run ten to twelve months in the year (when the demand for logs is good), and the Interior districts, where nearly all logging is done by horses in the fall and winter. The output of the Coast is about four times that of the Interior.

The conditions under which logging operations are carried on require careful inspection to safeguard a Government revenue, which in 1913 was about $500,000 from this source alone. This inspection is made by the Forest Rangers and Forest Assistants under the direction of the District Foresters. To protect the public interest and to afford the loggers the facilities which they desire for doing business with the Forest Branch, it has been found necessary to issue instructions that each operation is to be inspected, on an average, every three months during its continuance. Last summer the organization and supervision of fire-protection obliged the patrol staff in the Coast districts to neglect logging inspection, and experience has thus shown that the staff in these districts has never been adequate to deal with the requirements of the public or to give systematic attention to important current business. Recommendations for an increase in its numbers are therefore being submitted.

The results of this year's logging inspection have shown several certain definite violations of the "Forest Act" which must be guarded against. I wish to emphasize here that the prime object of an inspection of logging operations on the part of forest officers is not to discover

trespass or other illegal action, but is to co-operate with the logger by providing him with any information which he may lack, and thus prevent trespass or error on his part.

It is very difficult in some regions for loggers to avoid innocent trespass due to overlap of surveys, absence of clearly marked survey-lines, or existence of duplicate and unofficial surveys. Such innocent trespass will be avoided in future by inspection by the Ranger, who will see that the correct boundary of the operation is clearly marked on the ground.

Adjoining many existing logging operations are small fractions or fringes of Crown timber which will never be utilized unless logged in conjunction with the present operation. A valuable feature of regular logging inspection is that it discovers such areas and initiates a sale of what would otherwise be wasted. The revenue from such sales will much more than pay all costs of carrying on the general work of logging inspection. It is estimated that the timber comprised in such fractions in the Coast District amounts to about one-quarter of the timber held under licences. There have been up to the present applications for forty of such fractions. Twenty-five of these have already been cruised and will produce a revenue of $60,000.

Another form of innocent trespass arises from ignorance of the law, and results in logging on unsurveyed licences, expired licences, or uncompleted applications to purchase land. The only possible preventive of such operations is the regular inspection by each Ranger of all logging operations on Crown lands in his district. Such inspection, followed by a detailed report to the District Forester, will ensure that no logging operations will be conducted without proper title to the timber. During 1913 there were discovered and dealt with twenty-eight cases of logging on unsurveyed timber licences, four cases of logging on expired timber licences, and two cases of logging on uncompleted applications to purchase. The stopping of these operations was a protection to those loggers who had made legal payment for their timber.

There are comparatively few cases of intentional trespass. Nevertheless, as a preventive, it is a routine duty of the Rangers and field officers of the Forest Branch to examine the boundaries of logging operations for trespass. During the past year forty-three cases of trespass were discovered which could be classified as intentional, the revenue resulting from thirty-six of them being $11,302.76. The remaining cases are pending settlement.

The legislation under which timber has been disposed of in the past has created ten classes of timber on which the revenue due to the Government varies from nothing in the case of timber on Dominion lands to $2.50 per thousand feet in the case of some timber-sales. Operations carrying different royalty rates frequently have adjoining boundaries, and in such cases the logs are put into the water together and towed to a common market, such as Vancouver. The only available means of ensuring the correct payment of royalty and stumpage on timber from each operation is to make certain that every log is properly marked before it goes into the water; the collection of hundreds of thousands of dollars a year depending on this simple fact. In view of its extreme importance, the Rangers report on log-marking at every inspection of each operation; they also report on the marks on all the booms they examine; the scalers report on each boom scaled; the export patrol reports on each boom exported. In the upshot, it has been necessary to make fifteen seizures for the non-marking of logs, some of which have resulted also in loss of time by tugs engaged in towing booms. The gradual stricter enforcement of this important provision of the "Forest Act" by the Branch has resulted in a great improvement in the care and thoroughness with which operators have marked their logs.

A provision of every timber licence is that neither Japanese nor Chinese may be employed in connection with operations on the timber, and this provision has been rigidly enforced, it having been necessary in one case to cancel a licence for continued violation of this provision. In consequence, there are now no Chinese or Japanese engaged in operations on licences.

Looking at the matter in a general way, experience shows that perhaps the most important feature of the work of logging inspection is the opportunity which it provides for the establishment of closer relations between the forest officers and the men engaged in the various forest industries. The effects of this are already apparent in the unexpected co-operation which the Branch is receiving in working towards better slash-disposal and cleaner logging.

The greater part of the land now being logged in British Columbia is fit only for the production of timber. Add to this the fact that conditions of soil and climate favour the rapid growth of a new crop on logged-over land, and it is obvious that both reafforestation as well as the protection of the remaining standing timber renders the question of slash-disposal a matter

of immediate importance. Study is gradually being made of the best methods of disposing of logging-slash on the different forest types. A campaign for slash-disposal based upon this information is being conducted, and regulations will gradually be established and enforced as part of the routine of logging inspection.

It is admitted that clean logging will depend upon the lumber market, for when there is no market for low-grade lumber the logger will feel disposed to leave low-grade logs in the woods. The general study which has been made up to date shows, however, that even under the market conditions which have governed during the past few years a great deal of material has been left to rot which could have been taken out profitably. The truth of this statement is borne out by the varying standards of different loggers. Some of the most successful in British Columbia have made a study of clean logging, and by cutting low stumps, exercising care in falling so as to reduce breakage, carrying log-lengths so as to take the full merchantable length of the tree, clean yarding, and using inferior logs for construction-work and fuel have greatly increased the productivity and profits of their operations. On those operations where such business principles have not yet been adopted there is a tremendous waste of timber and consequent loss to the Government in royalty revenue. It is the aim of the Forest Branch to continue to work steadily towards a reduction of logging-waste by gradually bringing all operators up to the standard of utilization set by the most successful among them. This will become the most important feature of logging inspection.

SCALING.

By providing that all mills cutting over 500,000 feet per annum must employ a scaler licensed by the Government, the "Forest Act" made possible the regulation of scaling through the Province. At the beginning of the present year a Board of Examiners was consequently appointed, and a series of examinations were held at the chief centres of the lumbering industry, applicants for scalers' licences being required to pass both practical and written tests, as well as to supply evidence of good character. One hundred and six of these men were successful in obtaining licences.

The effect of this system has been most beneficial. The possession of a Government licence gives the scaler a definite feeling of responsibility and a well-defined position; while the Government's revenue from cut timber is protected by the fact that the man who measures it has been tested and found fully qualified, and that negligent or dishonest work would jeopardize the licence through which he earns his living as a scaler. This view of the matter is confirmed by the fact that the three Check Scalers who have been appointed to the permanent staff of the Branch in the Upper Country have found that licensed scalers are doing their work in a fair and just manner.

Up to the present the employment of licensed scalers has been practically confined to the Interior of the Province, scaling on the Coast being done by officials of the Forest Branch, except in the case of small mills not easily accessible from Victoria or Vancouver whose cut is insufficient to justify the special assignment of an Official Scaler. Arrangements are made whereby these mills are allowed to utilize the services of local residents approved of by the Branch as acting-scalers. The extension of the licensing system to the Coast, which is now contemplated, will make it necessary for these acting-scalers to take the examination and obtain licences, thus giving the Branch more effective supervision of their work. In the Interior also the exemption of mills cutting less than 500,000 feet a year from the necessity of employing licensed scalers is unsatisfactory, and the removal of this provision from the Act is recommended.

During the past season nearly 150 mills in different parts of the Province were unprovided with licensed scalers, and a considerable amount of persistent work by the Board of Examiners will therefore be necessary in the coming spring on this account.

Timber sold by the Branch under the "Forest Act" frequently carries a stumpage price ranging up to $2 per thousand feet in addition to the usual royalty. As much of this timber is logged in the course of operations upon adjoining timber subject to different dues, it has become necessary in many cases to assign officials of the Branch to scale the higher-priced logs before removal from the sale area. These men also supervise the marking of logs and enforce special conditions of each sale concerning such matters as clean cutting, slash-disposal, and fire-prevention. Both this work and the scaling of royalty-paying timber cut during railway-

construction have thrown additional work upon the scaling staff. Developments of this nature will be met as far as possible by utilizing the services of the permanent District Rangers, whose time hitherto has of necessity been chiefly devoted to the organization of forest-protection. As far as the district organization in each locality is concerned, the fusion of all forest-work and its execution by the Ranger staff is the object held in view, the employment of specialists in particular lines being maintained only in so far as special circumstances render this necessary. In the Vancouver, Prince Rupert, and Island Districts, which include the greater portion of the logging business of the Province, the official scale of the Forest Branch is the compulsory basis for all dealing in timber, and a staff of scalers has consequently to be concentrated at sawmilling centres such as Vancouver, Victoria, and New Westminster. In the Interior, however, where the general adoption of a system of bush-scaling is aimed at, this work will naturally form part of the duties of the Forest Rangers.

The accuracy of the work of our Official Scalers was frequently tested during the past year, and the results were most gratifying. One series of tests which included eighteen booms showed an aggregate difference between the original and the check scale of only a fraction of 1 per cent.

It is by no means easy to arrange for tallying booms through the mill, but in two cases where this was found possible the confirmation of the official scale was further proof of the high level of efficiency shown by the staff. The Branch, however, has been studying how to give still better service to the public. In the Island District the experiment of supplying operators with scale returns showing the scale and deduction for defects for each individual log is on trial. This method has certain advantages, and in particular gives a very thorough check on the important matter of log-marking. On the other hand, it necessitates the employment of a helper for each scaler, and reduces the speed of work by about 37 per cent.

The scale returns of the year give the following total:—

	Feet B.M.
West of the Cascades	785,242,084
East of the Cascades	361,868,550
Timber from land Crown-granted prior to April 7th, 1887	289,931,305*
	1,457,041,939

These figures show an all-round increase on those of 1912 and break all previous records for the Province.

GRADING.

Until the present year no grades for cedar logs had been established in the Province, and it therefore devolved upon the Branch to place this matter upon an official footing. The grades given below were established after very careful investigation, and have given excellent results.

On a recent occasion an opportunity was offered to the Branch to witness the sawing of one of these booms which had been graded as 48 per cent. No. 1, 48.8 per cent. No. 2, and 3.2 per cent. No. 3. The results were that logs graded as No. 1 yielded 80.5 per cent. clear, 10.1 per cent. common, and 9.4 per cent. shingles; for logs graded as No. 2 the figures were 48.3, 22.3, and 29.4 per cent.; and for No. 3 logs 23.3 and 76.7 per cent. In the aggregate cedar booms graded under these rules gave 34 per cent. No. 1, 41 per cent. No. 2, and 25 per cent. No. 3; the tax on cedar exported from the Province under section 58 of the "Forest Act" thus averaging $1.54 per thousand feet B.M.

GRADING RULES FOR CEDAR LOGS.

No. 1. Logs 12 feet and over in length, 20 inches and over in diameter, that will cut out 50 per cent. or over of their scaled contents in clear lumber. In cases of split timber above diameter will not be considered.

No. 2. Logs 12 feet and over in length, 14 inches and over in diameter, that will cut cut merchantable or better, but which will not cut to grade No. 1 lumber. This grade will also admit of a good grade of shingle-log.

No. 3. Rough logs that are only fit for a low grade of shingles, shiplap, or dimension timber.

Culls. Logs lower in grade than No. 3 will be classed as culls.

* Practically all cut in the Coast districts.

GRADING RULES FOR SHINGLE-BOLTS.*

Bolts to be measured in the following manner: To be as closely piled as possible, 4 feet high, 8 feet long, and the average number of pieces taken in the piles; the quantity to be obtained by dividing the number of pieces by the average contained in the piles. If piled loosely, sufficient allowance to be made to make up a cord of closely piled bolts.

No. 1. (*a.*) To be of first-class timber of an average of not more than 30 bolts to the cord, 52 to 54 inches in length, straight, well made, hearted, and barked.

(*b.*) Seventy per cent. of the bolts to be clear, balance to allow of two small knots in each bolt, 1 inch in diameter.

(*c.*) To be free from rot, shakes, and knot-holes and other defects.

No. 2. (*a.*) To be well made, hearted, and barked, and of an average of not more than 36 bolts to the cord, 52 to 54 inches in length.

(*b.*) To be free from rot, shakes, and worm-holes.

No. 3. (*a.*) To be hearted and barked, not more than 40 bolts to the cord, 52 to 54 inches in length.

(*b.*) Twenty-five per cent. to be clear, balance to allow any bolt which has two cuts, with one knot 2 inches in diameter in each cut.

(*c.*) To be free from rot, shakes, and worm-holes; any bolts not up to the standard of the grade to be considered culls.

GRADING RULES FOR FIR.†

Flooring. Logs suitable for flooring, reasonably straight, not less than 20 feet long, not less than 30 inches in diameter, clear, free from such defects as would impair the value for clear timber.

Merchandise. Logs not less than 14 inches in diameter, sound, reasonably straight, free from rotten knots or bunch knots; the grain straight enough to ensure strength.

Rough. Logs having visible defects such as crooks, bad knots, or other defects that would impair the value and lower the grade of lumber below merchandise.

Culls. Logs which will not produce 50 per cent. of their contents in saleable lumber shall be classed as culls.

GRADING RULES FOR SPRUCE, PINE, AND HEMLOCK.

No. 1. Logs 12 feet and over in length, 30 inches in diameter and over up to 32 feet long, 28 inches if over 32 feet long, reasonably straight, clear, free from such defects as would impair the value of clear lumber.

No. 2. Logs not less than 14 inches in diameter, sound, reasonably straight, free from rotten knots or bunch knots; the grain straight enough to ensure strength.

No. 3. Logs having visible defects such as crooks, bad knots, or other defects that would lower the grade below merchantable or No. 2.

Culls. Logs which will not cut 50 per cent. of their contents in saleable lumber shall be classed as culls.

TIMBER SALES.

The Order in Council of December, 1907, which placed the forests of the Province under reserve, brought to an end the staking of timber licences. This reserve remained in force until the passage of the "Forest Act" at the beginning of 1912, and it was not until the latter date that provision was made for the selling of Crown timber and authority given to the Department to deal with this matter. At first, when the new procedure was on trial, a somewhat lengthy period of public advertisement was called for by the Act; but in 1913 simpler methods were introduced in order to facilitate sales of timber to small operators. Experience has now shown that additional changes in this direction are desirable, and a further amendment of the Act at the approaching session is recommended.

The majority of applications to purchase Crown timber received by the Branch have naturally referred, so far, to fractional areas adjoining existing logging operations. No question of Government policy has been involved in dealing with small quantities of timber so situated, for the existing operation, in most cases, provided the only satisfactory means of removing the timber, and its sale to the operator has been a mere prevention of waste in which the interests of operators and Government have been identical.

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* As adopted by British Columbia Lumber and Shingle Manufacturers' Association, Vancouver, B.C., 29th January, 1913.

† As adopted on August 23rd, 1906, at a joint meeting of representatives from British Columbia Lumber and Shingle Manufacturers' Association, and adopted by the Government.

NOTE.—In all cases the scaler has the right to use his own judgment, for there are defects characteristic of timber in certain localities for which it is impossible to make rigid rules.

Apart from routine matters of this description, the general management of the immense forest assets possessed by the Province has been given considerable attention, though market conditions during the past year and the present capacity of the sawmilling industry have not rendered advisable any heavy selling of stumpage by the Government. On the other hand, the obvious need of clearing the forest from certain lands suitable for agriculture has been the reason for sales such as those of timber upon fruit lands in the Kootenays. The provision of adequate supplies for pulp-mill enterprises has led to others, foreshadowing the increased activity by the Branch in this direction which will follow naturally upon the opening of the Panama Canal and the completion of the new transcontinental railways.

The particular problem which is now before the Department is the establishment of a prompt efficient machinery for supplying local needs for lumber and other forest products in the less-developed regions of the Province. The desirability of avoiding the office delays in routine sales of small amounts of timber that correspondence with the Victoria headquarters renders inevitable, and of making the District Foresters responsible for such business, is strongly indicated. The substitution, wherever possible, of small timber-sales for hand-logger licences is another matter requiring attention by the district offices. Such sales would give the more enterprising hand-logger, who is at present forbidden to use steam machinery, opportunity to work up and improve his position; while the Crown would benefit through the cleaner logging precautions against fire and equitable upset prices that would be the conditions upon which the timber was sold. The progress of settlement in so many districts must come through the development of lumbering and the establishment of a pioneer population of lumbermen-settlers encouraged by a wise and stable forest policy will often prove the starting-point of local development.

From another point of view, it is evident that the lack of proper facilities for obtaining necessary supplies of timber in any particular region is a direct incentive to fraudulent entry upon timber land and logging trespass. A well-thought-out sales policy in each forest district, combined with the reduction now contemplated in the area patrolled by each Ranger, will do away with violations of the law of this character, and with the many seizures of considerable quantities of illegally cut Crown timber that it has been the unpleasant duty of the Branch to make.

The general field-work of the Branch, both in reconnaissance and in the numerous land examinations, which occupy so large a place among its routine duties, is yielding a quantity of valuable data concerning the different forest-areas of the Province. From study of this material the main outlines of a general timber-sale policy are being gradually constructed, though naturally at this early stage of its development the Branch has been obliged to concentrate more particularly on immediate matters, the investigation of the numerous applications received from operators and the cruising and surveying of approved sale projects having thrown a heavy amount of current work upon the field staff. This again has been increased by the labour involved in dealing with such matters as the compilation of volume tables for cruising; with the study of practical ways of securing cleaner logging, and better preparation of the ground for natural reafforestation; and with the determination of areas over which stumpage sales are desirable in order to market fire-killed, overmature, or insect-damaged timber.

During the year covered by this report fifty-nine sale projects covering 22,775 acres (with a total estimated stand of 208,615,251 feet B.M.) have been cruised and advertised at upset prices ranging from $2 per thousand feet downwards. This upset price is in addition to the usual royalties and rentals; while all expenditure incurred by the Government in connection with each sale is refunded by the purchaser. The twelve months' sales represent a total asset of $238,476, with a further $147,640 under advertisement. In every case the immediate cutting of the timber is an express condition of the sale, and the contract into which each purchaser enters with the Government provides for clean logging to the degree considered practicable for the area in question.

RAILWAY PERMITS.

In its general encouragement of railroad-building in the Province it has always been the policy of the Government to give, free of charge, all timber from the Crown forests that might be required for construction purposes, and thus the various company charters as well as the "Railway Act" itself provide for such free use. In years gone by this privilege was made use

of by contractors without the least regard for the safety of the surrounding forest; slash and debris of the most inflammable character were accumulated recklessly in the near neighbourhood of the railway-line, thus forming fire-traps of the most dangerous description; and the immediate result of construction (instead of being a benefit to forest industries) was usually the ruin of the timber resources of the regions made accessible by the new transportation route.

Co-operation, however, with the Dominion Board of Railway Commissioners at length enabled the Province to control the fire-danger along all construction-lines. To achieve a similar result in the adjoining forest-areas from which ties, bridge timbers, and other material were obtained by contractors, the Government has exercised its power of enforcing conditions upon the free use of Crown timber. In the first place, the railway company is required to make application for permission to cut timber on specified areas. These areas are examined by the District Forester concerned; the company binds itself to deal with the slash created by its cuttings at its own expense and in such manner as will meet with the approval of the Forest Branch; and, provided the lands are vacant, a provisional permit is at once issued, subject always to subsequent correction by the Chief Forester. Effective control of the situation is thus obtained without imposing hardship and delay upon contractors and sub-contractors. Special slash-disposal conditions are inserted in each permit, so as to meet the needs of different forest types, and in every case the Branch deals only with the representatives of the railway company itself, who are responsible for the proper fulfilment of the terms on which the timber is granted.

It has taken a great deal of persistent and tactful work on the part of officials of the Forest Service to secure observance of these conditions by the hundreds of contractors, sub-contractors, and piece-work men who have been engaged upon the 1,800 miles of railway-construction in this Province, and to make this scattered force realize that definite supervision of the cutting of Crown timber had replaced the old go-as-you-please traditions. The success of the Branch in this direction has been most striking. In almost every case slash and brush has either been piled and burned or else fired broadcast under the direction of forest officials, and the net result of the past two years' work in this direction has thus been the successful handling of a fire problem that has long been the despair of most forest services on this continent.

During the year ninety permits covering 138,276 acres have been issued, fourteen applications were disallowed, and seventeen are now pending. The following railways were concerned:—

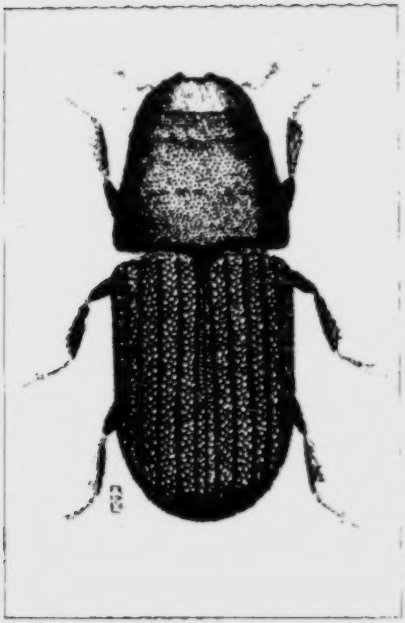
	No. of Permits.	Area.
		Acres.
Grand Trunk Pacific Railway	39	49,923
Pacific Great Eastern Railway	14	15,324
Kettle Valley Railway	5	7,727
Canadian Northern Pacific Railway	32	65,302
	90	138,276

The distribution of these permits by forest districts is as follows:—

	No. of Permits.	Area.	Volume cut.
		Acres.	Feet B.M.
Kamloops Forest District	27	45,942	23,088,000
Tete Jaune "	16	42,330	15,200,000
Hazelton "	20	23,742	17,020,000
Lillooet "	14	15,324	1,600,000
Vernon "	5	7,727	7,050,000
Fort George "	8	3,211	24,360,000
	90	138,276	88,918,000

Fence-posts made from cedar on right-of-way of C.N.P. Ry., on North Thompson.

Shingle-bolt timber after removal of bolts.



The Western Pine Bark-beetle (*Dendroctonus brevicomis*, Lec.), greatly enlarged.

The larva, or grub, of the Western Pine Bark-beetle, greatly enlarged.

Base of Bull-pine attacked by Bark-beetles. Many pitch-tubes are seen on surface of the bark.

PRODUCTS.

It must be admitted that there is less progress in British Columbia in the utilization of waste timber for the manufacture of by-products than elsewhere in Canada. The complete utilization of timber is only possible where stumpage is valuable, labour is cheap, and there is a large buying population which can be reached without excessive freight rates. These conditions do not yet exist in British Columbia; consequently, only a small proportion of the forest can be marketed, and large quantities of timber are left in the woods or sent to the burners because no profitable use can be made of them. Nothing can be accomplished here on a commercial scale approaching the complete utilization effected in Europe and in some parts of Eastern Canada. High freight rates prohibit the shipping of small wooden articles away from the Province: the local population does not create a demand which cannot be more cheaply supplied from elsewhere, and even if a demand did exist for articles which could be manufactured from what is now termed waste, it would be cheaper to buy good logs than to gather up the inferior material now left in the woods or sent to the burners. Clean logging and complete utilization will therefore come slowly in British Columbia. At present the most complete utilization in the Province is in the Crowsnest Division of the Cranbrook District, where green and dead material down to 3 inches in diameter and 3 feet long is taken off for use in mines.

Nevertheless, the lumber manufacturers of British Columbia have by producing lumber in odd and even lengths and widths saved a great deal of high-grade lumber, and have set an example in close utilization to all other lumber-producing districts on the continent. Another common form of saving waste is the taking out of cedar for shingle-bolts and posts. The market for these commodities is increasing, and it may be confidently expected that hereafter very little cedar will be lost. On the Coast the pulp-mills use large quantities of hemlock which under market conditions could not be utilized for lumber manufacture and would otherwise be left in the woods to rot. An unsuccessful attempt was made to market hemlock-bark, but the cost of preparing it was found to be too great. The coal-mines of the Prairie and Crowsnest District provide a steady market for material too small to put into lumber. Aside from the instances quoted, logging operators west of the Cascades leave nearly everything in the woods that will not produce a No. 2 or good No. 3 log. Utilization east of the Cascades is much more close, and compares favourably with conditions in Eastern Canada.

The chief market for sawmill refuse is found in fuel, which production is an important side-line of every sawmill in or near a centre of population. The market for this in 1913 was (because of the coal shortage) better than ever before, the sale being estimated at 300,000 cords, valued at $900,000. Large quantities of sawmill refuse are also used under burners to produce power; and in addition the manufacture of sawdust briquettes for fuel purposes has been started. These appear very satisfactory and sell for the same price as coal.

An outlet for the use of sawmill-waste may be found in the manufacture of sulphite pulp. A 40-ton plant has been erected in connection with a sawmill at Marshfield, Oregon. This plant, if it proves successful, may cause the utilization of similar material in British Columbia.

A study of the wood-using industries of the Province is now being made by the Forest Branch. The results will be published in such a manner as to make known the importance of these industries, and to suggest, if possible, new markets for materials now unused.

FOREST-INSECT DAMAGE.

During the past two years timber-owners have reported to the Forest Branch several instances of destruction of merchantable timber by forest insects. The investigations of the past decade in the Pacific North-western States have shown that there is annually an enormous loss of valuable timber due to forest insects, which in importance is comparable only to the loss by fire. The same investigations have shown that insect depredations can be controlled economically. An arrangement was therefore made with Dr. Gordon Hewett, the Dominion Entomologist, for a co-operative study of the forest insects of British Columbia. Professor J. M. Swaine, one of the leading authorities of the continent, spent the summer in the Province making a preliminary investigation of the insects affecting yellow-pine, Douglas fir, Sitka spruce, lodge-pole pine, and western white-pine. The following is Mr. Swaine's report:—

"The portion of the Province of British Columbia covered in the survey included part of the Kootenays, Okanagan, Similkameen, Lower Coast, and Vancouver Island regions. Several destructive outbreaks of bark-beetle were located and studied, and much practical information was obtained for future control-work with a variety of forest insects. A large collection of forest insects and their work was made which will be of much practical and scientific value.

"The greater abundance of destructive species in the Interior is to be explained by the susceptibility of the species of trees occurring there to the attack of destructive pests, rather than by any peculiarity of climatic conditions, for very great variations of soil and climate occur between the Similkameen and the Kootenays.

"The bull-pine or western yellow-pine (*Pinus ponderosa*) is subject to attack throughout its range in British Columbia by three destructive bark-beetles. The western-pine bark-beetle (*Dendroctonus brevicomis*, Lec.) is the most injurious. The mountain-pine bark-beetle (*D. monticolæ*, Hopk.) is almost as serious an enemy to the bull-pine as to the western white-pine from which it derives its name. The red turpentine bark-beetle (*D. valens*, Lec.) is abundant in the bark about the base of green pine attacked by the two more destructive species just mentioned. Serious injury by these insects is evident in many places, but the most important and extensive outbreak appears to be that about Princeton.

"The trouble is evidenced by the clumps of dead trees, 'red-tops,' which are now becoming numerous throughout the valley and upon the mountain-sides. When examined this summer the clumps of red-tops contained from five or six to about thirty-five trees, and will now be considerably larger. The beetles had then left the dead trees and were to be found in immense numbers cutting their tunnels in the inner bark of the trunks of green, healthy trees surrounding the clumps of red-tops. Of the three species involved in this outbreak the western-pine bark-beetle was apparently the most destructive.

"The western-pine bark-beetle (*Dendroctonus brevicomis*) is a cylindric hard-shelled beetle, from $^{7}/_{16}$ to $^{9}/_{16}$ inch in length, and varies in colour from light brown when recently transformed to nearly black in older specimens. It is clothed with very short, inconspicuous hairs. The young are small, whitish, footless grubs found boring chiefly in the middle layers of the bark. The beetles enter the green bark in pairs and excavate winding tunnels through the inner bark between the bark and the wood. The eggs are deposited in shallow niches along the sides of these tunnels, and the grubs which hatch from the eggs bore irregularly through the middle layers of bark. They either transform to the perfect stage in the fall and remain beneath the bark over winter, or pass the winter as grubs within the bark and complete their transformation in the spring. They pass the pupal stage in the enlarged ends of the larval mines in the middle layers of the bark. After the change to the perfect or beetle stage, the insects emerge during the summer months through round holes cut in the outer bark, and spread the infestation to fresh trees. They never enter the old trees after all the bark is dead. In the bark of these will be found only dead beetles and a few belated in their transformations.

"The mountain-pine bark-beetle (*Dendroctonus monticolæ*) is very similar in appearance and habits to the former. It is referred to again in connection with mountain-pine.

"The red turpentine bark-beetle (*D. valens*) is larger, being $^{3}/_{8}$ inch in length, and reddish brown in colour. It works in the bark of the base and lower part of the trunk. Its tunnels are much wider and the eggs are laid in elongate masses along the tunnel-side. The larvæ bore in congress through the inner bark. This species usually prefers dying bark and is commonly found in fresh stumps. It is sometimes quite injurious and is of some importance in this outbreak.

"The pitch which flows from the entrance-holes of all three species forms tubes of gum, 'gum-tubes,' or 'pitch-tubes,' which are clearly visible externally on the bark, and indicate that the tree was attacked while green and sappy; they also serve to distinguish the recently infested trees. More or less reddish boring-dust, ejected from the tunnels by the beetles, is usually to be seen lodged in crevices in the bark of infested trees. The boring of beetles and their larvæ through the inner bark cuts off the sap-flow and seriously weakens or, more usually, rapidly kills the tree. Some trees survive attack for several seasons; but when the beetles are very numerous, as in the Princeton outbreak, the infested trees are usually killed in one season. From 1,500 to 2,000 pairs of beetles were working in the lower 50 feet of each of the trunks of the infested trees examined there this summer. Usually the foliage of the trees attacked

become yellowish during the fall and early winter and red by spring. During the following season the beetles emerge and the trees appear as 'red-tops,' losing much of their foliage during the following winter and spring. Many larger wood-borers deposit their eggs in the bark of these trees during the first or second summer and the resulting grubs bore large tunnels through the sap-wood, and later certain species enter the heart-wood; so that by the end of the second season much injury has been caused. In many cases the timber is quite worthless by the third winter.

"CONTROL MEASURES FOR THE WESTERN-PINE BARK-BEETLE.

"Outbreaks of injurious bark-beetles in British Columbia can be controlled, if taken in time, by logging operations modified so as to include the trees containing the brood, and employing proper means for destroying the latter. The beetles and grubs pass the winter in the bark of the trunk of trees attacked that season, on which the foliage would still be pale green, yellow, or reddish, with the bark studded with fresh gum-tubes. If over three-fourths of the infested trees can be handled so as to kill the contained brood before they emerge in the early season, the outbreak will be checked; and by similar work upon the relatively few trees attacked the succeeding season, can be brought under complete control. The broods in the bark can be destroyed by whichever of the following methods is best suited to local conditions:—

"*Floating the Logs.*—Where water is available the simplest method is to float the logs as soon as they are cut, or as early in spring as possible. This will kill the greater part of the brood.

"*Sawing during Winter and burning the Slabs.*—Where it can be done profitably, the infested logs may be sawed before winter and the slabs, which will contain the brood, burned before the spring opens.

"*Barking the Trees.*—It is always possible to fell and bark the infested trees during winter and burn the infested bark before the spring opens. The presence of the greater number of grubs in the middle layers of the bark renders burning the bark necessary in the control of the outbreaks involving the western-pine bark-beetle. Control operations must be completed during the period between November 1st and the following June, but should be finished as early in spring as possible.

"When it is not possible to utilize the timber profitably and control measures are found to be necessary to protect valuable holdings against ravages of the beetle, the infested trees may be cut, piled, and burned before spring opens.

"This control-work has reference solely to the freshly infested trees, with green, yellowish, or moderately reddish foliage, having the bark filled with the beetles and their grubs. It does not, however, refer to the old red-tops which have been dead for from one and a half to several years, and from which the beetles have emerged. The thick sap-wood of the bull-pine deteriorates rapidly from the action of insects and fungi. The red-tops killed by the bark-beetles should therefore be utilized for lumber as soon as possible, if their value is to be saved.

"Hundreds of trees have already been killed in this outbreak, and, unless proper control measures are soon undertaken, the large body of fine timber in the valleys of the Similkameen and Tulameen is threatened with widespread destruction. Similar outbreaks, as yet of lesser importance, are starting in several parts of the bull-pine country, and should receive attention before they spread beyond control.

"The western white-pine or mountain-pine (*Pinus monticola*) is very seriously affected throughout its range in British Columbia by the mountain-pine bark-beetle (*Dentroctonus monticolæ*, Hopk.). An outbreak in the Sugar Lake and Mabel Lake region has been running for about eight years, and a large body of fine timber has been killed by this beetle. Much of this killed timber has since been rendered valueless by the tunnelling of the larger wood-borers of the families Cerambycidæ and Buprestidæ. The outbreak has much the appearance of that about Princeton, except that it is less extensive, and this beetle has a stronger tendency to attack isolated trees.

"The work of the mountain-pine beetle is quite similar to that of the western-pine bark-beetle. The beetle itself is somewhat larger than the western-pine beetle—4 to 6.5 mm. (5/32 to ¼ inch)—and is sparsely clothed with long erect hairs. The beetles enter the green or injured trees in July and excavate an elongated, somewhat straight egg-tunnel upwards from the entrance-holes, between the inner bark and the outer layer of wood. The eggs are laid

along the tunnel-sides in shallow niches, and the grubs which hatch therefrom burrow away from the egg-tunnel through the inner bark. Gum-tubes are formed about the entrance-hole, and frequently reddish boring-dust is extruded.

"At the time of the visit there in July the beetles were leaving the red-tops, attacked last season, and entering the bark of green timber in large numbers. Unless control measures are undertaken soon, the white-pine of Sugar Lake will be largely killed.

"CONTROL MEASURES.

"The mountain-pine bark-beetle is controlled by the measures recommended for the western-pine bark-beetle. The control-work should be completed during the fall, winter, and early spring months to destroy the hibernating broods. If water is available, the infested logs should be floated before June 1st, or the logs may be sawn and the slabs burned, or the infested trees may be felled and the bark removed within the specified time. It is not so necessary to burn the bark in the control of this species. The grubs are mostly found in the inner bark, and the separation of the bark from the wood is found sufficient to kill a sufficient number of them.

"The infested trees may be recognized by the presence of large numbers of fresh gum-tubes upon the bark of the trunk, and frequently by the reddish boring-dust expelled from the tunnels and lodged in cracks in the bark. During the fall and winter the foliage of the infested trees fades to yellowish, and becomes reddish during the late spring and early summer.

"The lodge-pole pine (*Pinus murrayana*) is being killed at Sugar Lake by the mountain-pine bark-beetle. A report was received from the Canadian Pacific Railway forestry officials of extensive destruction of lodge-pole pine by bark-beetles in the Skookumchuck Valley; but I was unable to make a personal investigation. A species very closely allied to the lodge-pole pine bark-beetle (*Dendroctonus murrayanæ*, Hopk.) was found entering the bark at the base of healthy Engelmann's spruce in the Creighton Valley.

"The Douglas fir (*Pseudotsuga mucronata*) is sometimes killed by the Douglas fir bark-beetle (*Dendroctonus pseudotsugæ*, Hopk.). This beetle prefers dying bark and is everywhere abundant in the bark of stumps, felled trunks, and dying trees of Douglas fir and larch. It usually finds sufficient dying bark cuttings to satisfy its demands. It is, however, not infrequently found attacking sound timber, as was the case this summer in the Creighton Valley, where mature Douglas fir was being killed by its ravages. The beetles are somewhat similar in appearance to the *Dendroctonus* beetles already described, and cut egg-tunnels and larval mines in the inner bark.

"When control is advisable, the logs may be floated or sawed during winter and the slabs burned, or the logs cut and barked during winter. Control-work should be carried on during late fall and winter, so that the broods and the bark are destroyed before spring opens. The recently infested trees are to be distinguished by the reddish boring-dust ejected from the tunnels and lodged in cracks in the bark. The foliage becomes red during the winter and spring following the attack.

"THE LOWER COAST AND VANCOUVER ISLAND REGIONS.

"The timber of the Lower Coast and Vancouver Island is not at present suffering from extensive insect outbreaks; but there are incipent attacks which need to be kept under careful observation. Cedar and yellow cypress are quite generally hollow-hearted and stag-headed. These affections are probably always of a fungous origin. No serious insect injury to these trees was located in this summer's work. In many places the western white-pine (*Pinus monticola*) is being killed by the western white-pine bark-beetle (*Dendroctonus monticolæ*, Hopk.). It was found killing green timber, particularly at Cowichan Lake and the district about Campbell River. Wherever valuable stands of white-pine are held a watch should be kept for attacks by this destructive beetle. Clumps of red-tops and scattered red and yellow tops, with the bark bearing numerous tubes of gum surmounting vertical tunnels between the bark and the wood, are danger-signals, and should receive prompt attention if the timber is to be saved. The beetle responsible here is that already discussed as the mountain-pine bark-beetle.

"The Sitka spruce (*Picea sitchensis*) is subject to attack by a destructive bark-beetle of the genus *Dendroctonus*. Near Menzie's Bay this beetle has bred in fire-injured trees about a burn, and was this summer attacking nearly green timber of a large size. The same species

is becoming common in the dying spruce of Stanley Park, Vancouver. It is capable of becoming a serious enemy of Sitka spruce, and dying trees in clumps or as isolated trees, with the bark studded with gum-tubes, and the bark containing the brood and their tunnels, should receive prompt attention. Reports were received of dying spruce from farther up the Coast and on Queen Charlotte Island.

"Spruce gall-insects of the genus *Chermes* are commonly found on spruce, and are often seriously destructive to isolated trees or clumps, particularly in lawns and parks of towns and cities. Stanley Park, in Vancouver, is at present suffering from a serious outbreak of these pests. The minute young of the *Chermes* are found in the early season sucking the juice in the axils of the leaves of the developing shoots. The irritation from the work of adults and young causes an extra growth of tissues, and the peculiar somewhat cone-like galls are produced. The injured twigs usually die and the tree is weakened in proportion to their numbers.

"The balsam fir (*Abies grandis*) was being killed by bark-beetle of the genera *Hylurgops* and *Eccoptogaster*. This injury was noticeable near Alberni, and particularly about Campbell River.

"The Douglas fir, which forms the bulk of the timber of the region, is generally in fine condition. Several incipient outbreaks of the Douglas fir bark-beetle (*Dendroctonus pseudotsugæ*) should be kept under observation; but we know of no considerable body of dying timber. Isolated red-top fir has been killed by this species at Cowichan Lake and Campbell River, and it is everywhere abundant in slash and dying trees. The work of this beetle has already been discussed.

"The spruce bud-worm, which was very abundant in many places a few years ago, is now hardly to be noticed.

"Ambrosia-beetles of the genera *Gnathotrichus* and *Trypodendron* are excessively abundant in dying trees. Their small black tunnels pierce the sap-wood, but rarely penetrate more than 5 inches. The most injurious of the ambrosia-beetle belongs to the genus *Platypus* of the family Platypodidæ. It is very abundant throughout the Lower Coast and Island districts in freshly cut logs of Douglas fir, hemlock, spruce, and balsam, and drives its tunnels 7 inches and over into the wood. Considerable injury to reproduction was located. The Pissodes beetles or spruce and pine weevils are common in places, destroying the terminal shoots of young growth. In many places the cones of Douglas fir and bull-pine were being destroyed by caterpillars to a serious degree.

"Throughout the Okanagan and Similkameen Districts many bull-pines are stag-headed. All such cases examined had been caused by bark-boring caterpillars destroying the inner bark in patches about the trunk and base of the branches, working downward from the top. These dead tops were covered with resin and were perfectly sound.

"The bull-pine often suffers severely from attacks of twig-destroying beetles and caterpillars. In some outbreaks examined over half the branches had been killed on many trees by such work.

"This summer's investigation was primarily a survey to determine the extent of forest-insect injuries, and to decide upon proper control measures for the more serious outbreaks. Information was obtained of several extensive bodies of dying timber which could not be visited this season."

EXPORT OF FOREST PRODUCTS.

The life of the timber industry of British Columbia depends upon the profitable export of forest products from the Province, for the local population uses less than one-fifth of the timber annually produced, and the other four-fifths must be exported. The situation has become more acute during the past year or two owing to the decrease of building operations in the larger towns and cities of the Province, and consequent falling-off in the local demand for lumber.

There are two broad divisions of the export timber trade—the one comprising unmanufactured logs, piles, poles, mining-props, cedar posts, and pulp-wood; the other and more important class including all manufactured timber, lumber, sawn dimension timber, railway-ties (hewn and sawn), shingles, and lath. Legislation framed to encourage Provincial industries forbids the exportation of unmanufactured logs from lands held under lease, licence, or timber sale, or from those Crown-granted after March 12th, 1906. From lands Crown-granted between April 28th,

1887, and March 12th, 1906, timber may be exported upon payment of the royalty of 50 cents per thousand feet. Logs from lands Crown-granted prior to April 28th, 1887, may be exported upon payment of an export tax which is fixed in the "Forest Act," and varies according to the grade and size of the log. Practically all logs which are exported are taken from Vancouver, Victoria, or up-coast points to Puget Sound, none leaving the Province by rail. Illegal export is prevented and the collection of the export tax ensured by maintaining a launch patrol on the towing routes to Puget Sound, a patrol that has been made more effective during the past year by co-operative arrangements with the Dominion Customs authorities, under which export clearances are not granted to tugs with tows or cargoes of unmanufactured timber unless a permit to export has been secured from the Forest Branch. Three seizures were made by the export patrol during 1913, the cause in each case being the unsatisfactory marking of the logs.

During 1913, 120 permits to export logs were issued. The total quantity exported was 58,752,678 feet, which compares with previous years as follows:—

	Feet B.M.
1911	47,000,000
1912	53,280,375
1913	58,752,678

The export of logs is governed by the market on Puget Sound for cedar logs, for there are more shingle-mills in Washington than in British Columbia and a smaller supply of cedar logs, particularly of the number two logs used for shingles. The prices of cedar consequently rule higher on Puget Sound than in British Columbia. The exports for 1913 were less than for 1912, because of the slump in the American shingle business during the last quarter of the year and consequent depression of the log market.

The quantity of each species exported from British Columbia during 1913 was:—

	Feet.
Cedar	22,678,030
Spruce	1,759,131
Fir	509,149
Pine	391,037
Hemlock	3,369
Total	25,340,716

Species unidentified, 33,411,962 feet (exported at 50 cents per thousand).

Owing to the lack of grading rules for cedar, all cedar was exported as No. 3 grade until July, 1913. The rules were then adopted which are given on pages 61 and 62, and all subsequent exports since that date have been graded and have paid the tax accordingly. The quantity and proportion of each grade exported has been:—

	Quantity. Feet B.M.	Per Cent.
Grade No. 1	1,108,087	14
Grade No. 2	2,759,693	36
Grade No. 3	3,829,238	50

The export of smaller unmanufactured products is growing. For instance, there is keen market in the United States, on the Prairie, and in Eastern Canada for cedar poles, and the export of cedar poles for the year amounted to 2,562,942 feet. About 2,000,000 lineal feet were shipped from the Cranbrook and Nelson Forest Districts to the Prairie, the Central States, and Ontario; 500,000 lineal feet were shipped by boat from the tide-water camps to Central and Southern California. The total value of pole shipments was $179,406. Again, the Cranbrook and Nelson Forest Districts constitute the chief source of fence-posts for the Prairie, and furnish a large proportion of the railway-ties and mining-props used annually in Alberta and Saskatchewan. The production of these timbers has become an important adjunct to the lumber business in these districts and makes possible the complete utilization of all material. The exports of these products from these districts for the year were:—

	Quantity.	Value.
Fence-posts	11,190 pieces	$ 67,400
Railway-ties	1,128,270 "	451,308
Mine-props	6,000 cords	36,000

The total value of the logs, poles, piles, posts, ties, and props exported from British Columbia in 1913 was $1,321,040.78.

One seizure was made for illegal export. In this case a company operating a shingle-mill in Blaine, Washington, established on this side near the boundary-line a plant in which non-exportable logs were cut into shingle lengths, split on a saw, and exported to their shingle-mill in Blaine for manufacture into shingles. A shipment was seized, the case was taken to trial, and judgment was given in favour of the Forest Branch in the first Court. The judgment was appealed and decision has not yet been rendered on the appeal.

The most important item in British Columbia's trade is the export of manufactured timber. The Province has been so favourably situated for this trade that it has grown up without any form of Government or public assistance or encouragement. The three chief natural markets are the Canadian Prairie, the United States, and Eastern Canada, and the sea-borne cargo trade.

Up to the present the Canadian Prairie has been the most important market, for it has taken three-fifths of the timber-production of British Columbia, and the majority of the saw-mills in British Columbia have been built for this trade. An important feature of this market has been that, whereas the other export markets open to British Columbia mills will take only the highest grades, all grades may be shipped to the Prairie. During the past five years there has been keen competition in this direction. The lumber manufacturers of Western Ontario ship 50,000,000 feet per year into Winnipeg; the spruce manufacturers of the North (favoured greatly by freight rates) distribute about 225,000,000 feet annually; and the manufacturers of the Western States (whenever conditions are bad on the home market) unload 140,000,000 to 270,000,000 annually in the Canadian Prairies. The shipments of timber into the Western Provinces from the United States during the first eleven months of 1913 were about 50 per cent. less than during the same period in 1912 (which was the record year), and were not so great as during the same period in 1911. The exact shipments in comparison with 1912 and 1911 are as follows:—

IMPORTATIONS FROM U.S.A. TO MANITOBA, SASKATCHEWAN, ALBERTA, AND BRITISH COLUMBIA.

Lumber, Laths, and Shingles from January 1st to November 1st, 1911; January 1st to November 1st, 1912; and January 1st to November 1st, 1913.

	1911.			1912.			Increase 1912 over 1911.	1913.			Decrease 1913 over 1912.
	Feet B.M.	Value.	Aver. per M.	Feet B.M.	Value.	Aver. per M.		Feet B.M.	Value.	Aver. per M.	
Planks, boards, etc., dressed one side not dutiable	199,708,000	$ 2,324,994	$12.13	207,702,000	$ 2,377,362	$11.44	9	106,299,000	$ 1,532,780	$14.61	49
Sawn boards, etc., dutiable	31,348,000	390,806	12.11	49,291,000	645,670	13.09	58	17,843,000	303,971	17.04	64
	231,116,000	$ 2,715,800		257,053,000	$ 3,022,992			124,142,000	$ 1,836,751		
	Pieces.			Pieces.							
Laths	58,220,000	$ 134,795	2.31	68,720,000	$ 134,624	2.11	9	32,906,000	$ 78,361	2.37	48
Shingles	17,296,000	32,781	1.90	82,887,000	152,402	1.84	381	3,400,300	65,153	1.92	59
		$ 2,883,436			$ 3,309,958				$ 2,000,245		38

The decrease in the importations of American lumber as shown above was due to less general buying on the Prairie, and was reflected in British Columbia shipments as well. The lumber industry in British Columbia is so dependent on Prairie purchases that the effect has been most serious, prices having shrunk to an unprofitable level, and mills and logging camps having in many instances closed down for the time being. The depressing effect which the Prairie market has this year produced on the lumber industry in British Columbia emphasizes the necessity for establishing all possible trade outlets in other directions, to give stability to the business upon which more than any other the prosperity of the Province depends.

Many British Columbia lumber manufacturers believe that the time has come to develop the markets of Eastern Canada and the United States to a greater extent. The great lumber-consuming districts of this continent lie around the Great Lakes and along the Atlantic Coast, and the recent removal of the United States tariff on all lumber places British Columbia manufacturers in a position to compete on free terms with that great market of nearly 100,000,000 people. Up to the present, shipments to Eastern Canada have consisted of a few million feet of Douglas fir annually for large construction timbers, railway-car building, public works, boats, and scows; together with cedar shingles and cedar finish. Similarly, shipments to the United States have consisted of shingles for the Middle West and cedar finish for the New England States. Both in Canada and the United States there are many markets which can, and sooner or later will, be supplied from the United States. Douglas fir dimension timber in large sizes for big construction-works or in medium sizes for general construction will find sale in competition with Southern pine. Our shingles, moreover, can compete everywhere, while Douglas fir flooring and inside finish, cedar siding and clap-boards are on an equality with the best products of the East. The fight for larger markets will be greatly helped if favourable rates are secured through the Panama Canal. It cannot, however, be successful until the products which British Columbia lumbermen are ready to sell be made known in the buying centres of the East. Eastern people are surprised when they visit the Coast and see the beautiful effects produced in house interiors with British Columbia woods. They will buy this timber if it is put before them in the East.

The cargo trade of British Columbia has shown no signs of growth during recent years. It constitutes on the average less than 5 per cent. of the lumber trade of the Province, and only three or four mills are engaged in it.

The following table shows the comparison between British Columbia and the Western States:—

	From Washington, Oregon, Columbia River, and South.	From British Columbia.
Australia	177,556,404	25,788,248
West coast of South America	103,813,354	6,683,752
China and Japan	67,174,100	2,710,883
Mexico and Central America	32,118,885	552,492
United Kingdom and Continent	16,555,058	12,019,659
Africa	8,622,430	2,158,700
Other foreign ports	47,364,301	1,398,322
Philippines	16,364,301	.....
Hawaii	62,408,942	.....
East coast of U.S.A.	4,699,000	.....
	537,074,775	51,512,056

In addition to these cargo shipments, British Columbia exported 53,000,000 logs to the State of Washington.

The total timber imports of the principal countries of the world are annually about 7,507,300,000 feet B.M. British Columbia supplies but 1½ per cent. of this total, though no country is better equipped to be an important factor in the world's timber trade, the annual growth of merchantable material in the Province being several times the annual cut, and large quantities of it being accessible and cheap to log. Though at present the sawmill capacity of the Province could supply double the present trade, this unfavourable condition cannot be expected to continue when the Panama Canal is open and the new transcontinental lines have trebled our facilities for Eastern shipment. There are many timber-holders prepared to invest more money in logging and timber-manufacturing enterprises as soon as the market for their product develops.

Finding a market for more timber either in Eastern Canada, the United States, or the overseas countries is a long, slow process. Nevertheless, the increase of the industry and settlement of the Province depends largely upon it, as does any increase in the Government

revenue from royalty. Finding a market involves making the commercial timbers of British Columbia known to the purchasers of the world, a matter that is (after fire-protection) the most important work of the Forest Branch, which would naturally work out in conjunction with the lumber manufacturers of the Province the details of a campaign of trade extension such as is necessary. Representations have already been received from lumber manufacturers pointing out that their efforts to establish a trade with Eastern Canada would be greatly assisted if an exhibit of fully manufactured and finished British Columbia timber were established by the Government at some central point. I heartily concur with such a suggestion. No opportunity should be lost for placing exhibits of manufactured British Columbia timber in the lumber-buying centres of the world.

The past year has been the first in which the pulp industry has fulfilled its early promise. Two mills have been in operation during the full year, the Powell River having constantly reached its daily capacity of 225 tons of newsprint. It should be noted that a small portion of this suffices to supply the Provincial market, while freight rates prevent the shipment of newsprint to points east of Alberta. A small quantity of newsprint is shipped to be distributed from Calgary and Edmonton, the balance (comprising over 75 per cent. of the output) being marketed in the North-western States. Newsprint from British Columbia enters the United States free of duty under the clause admitting duty free paper valued at less than 2½ cents per pound.

The other operating pulp-mill of the Province, that of the B.C. Sulphite Fibre Company, on Howe Sound, has operated at capacity during the year, producing daily 40 tons of a very superior grade of fibre. The market for this product is altogether outside of British Columbia. Seventy-five per cent. of the output is sold in Japan; the remainder is sold to paper-mills in the North-western States. The manufacture of pulp products on a large scale in British Columbia depends upon the solution of the problems of labour, transportation, and markets, the prospects for which are satisfactory. As for the prime essentials, this Province possesses natural resources of pulp-wood and water-power which are not equalled by any other Province in Canada, the water-power on tide-water alone being estimated to be 1,000,000 horse-power, and many billions of feet of pulp-wood being tributary to this. When the trans-Pacific market for pulp products is developed, mills on tide-water in British Columbia will thus have great advantages in seeking trade. This market will sooner or later be essential to the success of the pulp industry in British Columbia, for the section of the Canadian population which under the present basis of fixing freight rates can be supplied by the mills of British Columbia in competition with those of Central and Eastern Canada will be the limited market west of Regina, while the new mills now contemplated or under construction in Alaska and the North-western States will reduce the available market for the British Columbia product in the Western United States. Fortunately, after the completion of the Panama Canal, the trade routes of the Pacific Ocean will lead direct to the chief pulp- and paper-importing nations of the world. Asia presents a great undeveloped market for pulp and paper—a market demanding special grades produced by special machinery processes, and in time will require heavy shipments of low-grade papers and high-grade sulphite pulp. The Australian and South African newsprint market should also be supplied from British Columbia. The greatest pulp anad paper market of the world is that extending from the Atlantic seaboard of the United States westward to Chicago. There is here at all times a keen demand for high-grade sulphite pulp, which now enters the United States free of duty. It is believed that with the opening of the Panama Canal shipments will become possible to the Eastern United States.

The total value of the pulp and paper exported from British Columbia in 1913 was about $3,000,000.

This survey of the present situation shows that the expansion of the pulp industry in British Columbia depends upon the same factor as the expansion of the lumber industry—namely, the development and extension of the export market. It is recognized that this work, which is so important to the public from the standpoint of commercial prosperity and to the Government from the standpoint of revenue, should not be left entirely to private individuals. Already in 1913 the production of $3,000,000 worth of pulp and paper has helped in the upbuilding of our commerce.

The work incident to the organization of the Forest Branch has prohibited the paying of much attention during the present year to the extension of markets for British Columbia forest products. However, as a result of co-operation between the British Columbia Lumber Manufac-

turers' Association and the Forest Branch, arrangements were made with the Dominion Public Works Department for the insertion of a clause in all contracts specifying that Canadian timber should be used. Again, negotiations with the Bengal and North-western Railway of India have resulted in the calling of tenders from British Columbia for the shipment of 120,000 creosoted Douglas fir railway-ties. Should this trial order prove successful a large business in this direction may be expected. The extension of the export lumber trade of this Coast has been taken up with the Dominion Department of Trade and Commerce, and an official of that Department who has made an investigation of foreign lumber trade will visit the Province to work out with the lumbermen and the officers of the Forest Branch a more progressive policy.

LAND EXAMINATION.

The experience of older countries and of Eastern Canada has been that settlement on non-agricultural timbered lands is not in the public interest. This experience is embodied in the Statutes of British Columbia when it is provided that land which carries timber in excess of 5,000 feet per acre east of the Cascades or 8,000 feet per acre west of the Cascades is not open for sale or pre-emption, and that all expiring timber licences or leases remain under forest reserve until examined and found valuable for agricultural or other purposes.

The organization of the Forest Branch with a permanent force of District Foresters, Rangers, and cruisers who are constantly covering the country in the performance of their fire-protection, logging inspection, and timber-sale duties has largely increased the staff available to the Lands Department for the inspection-work which is so necessary to prevent the alienation of timber land contrary to Statute. Pre-emptions and applications to purchase land in the timbered districts of the Province are thus referred to the Forest Branch for field examination. Whole tracts of land held under reserve are examined by the Forest Branch in order that the character of the land and the quantity of the timber may be ascertained and the reserve maintained on the timbered portions.

The policy of land examination is a most important part of land settlement. It protects a permanent source of revenue for the Province by ensuring that no bodies of merchantable timber will be acquired, except by public sale at an upset price which guards the public interest, and at the same time it protects the uninformed *bona fide* settler by preventing him from locating in some timbered non-agricultural tract where he could not be successful. This policy of examining land before settlement is now followed by the Dominion Government and the Governments of Ontario, Quebec, and New Brunswick. The total acreage examined in detail by the Forest Branch in 1913 was 156,416 acres. Of this, 108,437 acres were found to carry less than the statutory limit of merchantable timber and were recommended to be opened for settlement, while 47,979 acres were found to carry timber in excess of the statutory limit. The total quantity of merchantable timber estimated to be on these areas was 368,694,000 feet, on which the stumpage to the Government would be about $217,232.

The holding of timber under reserve does not prevent the development of the country, for it is very exceptional for *bona-fide* settlers to make homes on heavily timbered lands such as those reserved as a result of examination by this Branch. The policy of the Department wherever the land or timber is needed for development purposes is to offer the timber for sale by public tender at a fair valuation. The full value of the timber then goes to the public Treasury, and the land when logged is released for use. Every timber-sale contract in such cases requires that the land be logged off in one, two, or three years, depending on the quantity of the timber.

The results of this policy may best be explained by a few examples. An application was received for the purchase at $5 per acre of 173 acres of land for a mill-site on Cracroft Island. Cruising disclosed that the land carried 1,394,000 feet of cedar and 928,000 feet of hemlock and balsam. The land was unsuited for a mill-site, was non-agricultural, and was valuable only for the timber. The application to purchase the land was disallowed and the timber was sold at public auction for $4,506.50. The land still belongs to the Crown.

An application was received for the purchase of 320 acres of land in the New Westminster District. Inspection showed that there were on the area 3,590,100 feet of timber, an average of 11,220 feet per acre. The sale of the land was refused, and the timber alone was then sold at public auction for $5,893.76. The revenue from the land and timber if sold without examination would have been only $2,498.76.

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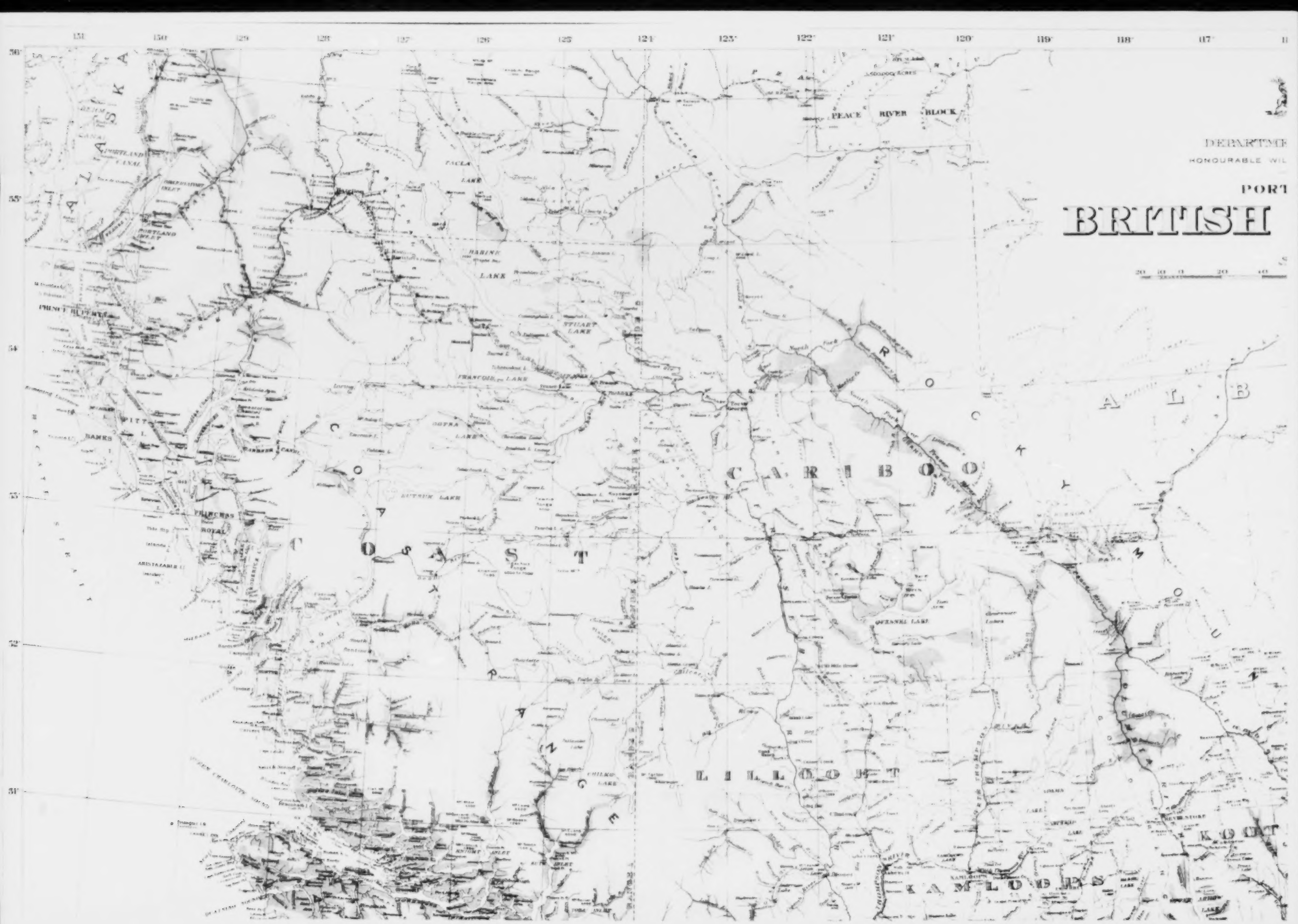


A pre-emption application was received for 80 acres on the Coast. The land when examined was found to be timbered, chiefly with Douglas fir to the extent of 1,750,000 feet, or 21,900 feet per acre. The pre-emption entry was disallowed; the timber was sold for $2,062.40. The tract is now logged off and will be opened for pre-emption shortly.

The above are fair instances of the financial benefits which result to the public from the examination of lands. A total of 14,458 acres of pre-emptions were examined this year, as well as 36,960 acres of land applied for under purchase. The pre-emption entries were found to include 3,978 acres of land carrying timber in excess of the merchantable limit, for which the Government will receive $39,650. The purchase applications were found to include 10,849 acres of land timbered in excess of the statutory limit, aggregating 113,470,000 feet, for which the Government will receive about $56,735.

Special examinations have been made of several areas concerning which the Lands Department required information for administrative purposes. The Kitimat Pre-emption Reserve was examined in detail before that land was opened for settlement. An area of 17,571 acres was covered. The whole valley was found to be wooded. A large proportion of the timber, however, was defective, and outside of the existing timber licences there were only 600 acres on which the timber averaged over 8,000 feet per acre. The area which was opened for settlement covered 16,911 acres.

A tract of 10,220 acres adjoining Shuswap Lake was examined to determine its fitness for settlement. It was found that 88 per cent. of the area was rough and broken and was fitted only for the production of timber. The remaining 12 per cent. of the area, 2,306 acres, was agricultural in character and recommended for settlement.

Twenty timber licences covering about 12,000 acres of timber on the shore of Buttle Lake, in Strathcona Park, were offered for sale to the Government in order that they might be included in the park. The timber on this area was cruised carefully and valued.

A tract of 15 acres on Cowichan Lake was also examined which had been offered for sale to the Government for park purposes.

Application was received for the remission of royalty on the fire-killed timber on 20,000 acres in the Nelson and Fort Sheppard Railway Land Grant. The tract was examined, and it was recommended that no remission of royalty be made, as it is customary throughout the Province to collect the royalty on any fire-killed timber marketed.

A very careful and detailed cruise was made of 1,798 acres of timber land held under lease in the vicinity of Salmo, in order to determine if the quantity of timber yet remaining on the leases, which covered agricultural land, justified the holding of this land under timber lease at the expense of possible settlement. It was found that the logging being done on these leases ranks with the cleanest logging in the Province. Everything is being taken off which will make a shingle-bolt or a fence-post. There is nearly 10,000 feet of this material per acre, most of which was dead and down.

At the request of the City of Vancouver a detailed cruise and valuation was made of the privately owned timber on 7,015 acres of the watershed of Seymour Creek, from which the city derives a portion of its water-supply. The object of this cruise was to determine the quantity and value of the timber in order that the city might have the benefit of unbiased information in concluding arrangements for the purchase of the timber. The cruise showed that there was 191,104,000 feet of timber, of which 148,775,000 feet were accessible.

A careful examination was made of 428,245 acres in the Columbia and Western Land Grant in order to determine for Government purposes the quantity and value of the timber and agricultural land.

A total of 662,280 acres were thus examined by the Forest Branch during the year. The maps and reports secured, showing in detail all important information regarding the quantity and value of the timber and the land, was made available to the different Government departments for administrative purposes.

FOREST RECONNAISSANCE.

Until recently the forest exploration of British Columbia depended upon private individuals, and there has not been available any definite information of the forest resources of the Province beyond the knowledge that 11,000,000 acres of merchantable timber has been taken up under grant, lease, or licence, and that a considerable portion of the remainder of the Province is

forested. The 11,000,000 acres produce an annual revenue of $2,000,000 and provide one of the main sources of Provincial industry and prosperity. Hence it is important to know what timber wealth is to be expected from the other 239,000,000 acres of the Province.

One of the first duties of the Forest Branch has therefore been forest reconnaissance, though the large amount of administrative work devolving upon the staff has prevented this work receiving in full the attention it deserves. This reconnaissance has been carried on by means of special parties sent out by the Forest Branch, Foresters attached to triangulation parties sent out by the Surveyor-General, and extensive work carried on by the District Foresters and the Rangers. First, attention has been given to the examination of land tributary to the new railroads—the Grand Trunk Pacific, the Canadian Northern Pacific, and the Kettle Valley. Second in importance have been the unknown timbered regions of the north —the Nation Lakes, Omineca, Nass, and Bella Coola Valleys. Further work has been done in the more settled districts of the southern portion of the Province—the Okanagan, Columbia, Kootenay, and Kettle River Valleys. Although the distribution of the work has been governed chiefly by the requirements of the Forest Branch for particular information concerning certain districts, it has so happened that large sample areas have been covered in all the forest regions of the Province. It is possible, therefore, from the results of the areas covered to date, to speak more authoritatively than ever before of the forest resources and forest possibilities of British Columbia.

An important feature of the forest-survey work has been the location and examination of bodies of agricultural land, the prompt location and careful description of which is most important. Detailed maps and descriptions of large areas of agricultural land have been forwarded to the Lands Department.

Forest reconnaissance covered 5,616,000 acres in 1912, and 12,308,000 acres in 1913. These areas are in addition to those mapped and reported on by District Foresters and Rangers or cruised by land-examination parties.

A brief description is given here of the area covered by each survey party. The forest cover on these areas may be taken as indicative of conditions in the surrounding and adjoining regions. In each case an estimate was made of the area burned over during the past seventy-five years.

OMINECA.

About 1,920,000 acres were examined in 1912 surrounding the Nation Lakes, in the Omineca District. The topography is rolling, intersected by mountain-ranges. The country is well watered with numerous lakes and rivers. The general elevation varies from 2,200 to 2,800 feet above sea-level, mountains reach 7,000 feet, timber-line being about 5,000 feet. Eight hundred thousand acres had been burned over. Only 18,000 acres of the remaining forest carried merchantable timber in excess of 5,000 feet per acre. The total stand on this area was about 130,000,000 feet. The stand in the remaining unburned forest averaged less than 3,000 feet per acre and was not estimated. Reproduction of the forest in the burned areas is excellent. About 350,000 acres has already come up in a satisfactory stand, consisting chiefly of: Jack-pine, 80 per cent.; poplar, 20 per cent.; spruce and balsam are found everywhere scattered thinly; and another 150,000 acres is covered with a lighter stand of similar composition.

Cattle-range is limited to the area between Tatla and Babine Lakes and the meadows north of Nation Lakes. It is only open for six months in the year.

BULKLEY VALLEY.

A strip ten to fifteen miles wide on each side of the Grand Trunk Pacific from Hazelton to Burns Lake was examined in 1912. The area covered was 583,040 acres. This was practically all valley land. The elevation varied from 1,500 to 3,000 feet above sea-level. Two hundred and nine thousand acres had been burned over. Of the remaining forest, 41,154 acres carried timber averaging over 5,000 feet per acre, aggregating a total stand of 300,000,000 feet. The timber in the remaining 330,000 acres of forest averaging less than 5,000 feet per acre was not estimated as merchantable, although some of it will be used because of its proximity to the railroad. The stand consists of spruce, cedar, white fir, and pine in the valley, with hemlock on the higher slopes up to timber-line, which is about 5,000 feet. The old burns are covered with poplar, cottonwood, and birch.

Summer range for cattle is excellent throughout the valley, but provision must be made for winter feed.

FORT GEORGE.

The reserve, three miles wide, on each side of the Grand Trunk Pacific from the junction of the North and South Forks of the Fraser to the Grand Canyon was examined in 1912. This lies wholly in the Fraser River Valley. The valley here is ten miles wide and is densely wooded. The elevation varies from 1,950 feet at the river-level to 2,400 feet at the outside of the three-mile strip. The land covered by the survey is fairly level and somewhat broken by swamps.

The area covered was 87,900 acres. Only 3,200 acres had been burned. The timber in 35,356 acres averaged over 5,000 feet. As in the Bulkley Valley, a large portion of the timber on the remaining area will be utilized, as it averages 3,000 to 5,000 feet per acre and is close to the railroad. In the valley the stand mainly consists of: Spruce, 60 to 80 per cent., and balsam; on the mountains hemlock, cedar, and fir. None of this area lies above timber-line. There is no good range for cattle in this area.

TETE JAUNE CACHE.

The three-mile reserve on each side of the Grand Trunk Pacific from the Alberta boundary to the Grand Canyon was examined in 1912. This tract lies wholly in the Upper Fraser Valley. The width of this valley varies from one mile at the eastern end to about ten miles at the western end. The elevation of the land examined varies from 2,025 to 7,000 feet. Six hundred and fifty-six thousand acres were examined. Only 21,476 had been burned. There are here 224,000 acres on which the merchantable timber averages over 5,000 feet per acre; the aggregate stand in this area is 1,870,000,000 feet. In addition, there is, as elsewhere along the Grand Trunk Pacific, a large quantity of merchantable timber on the 410,000 acres of forest which averages less than 5,000 feet per acre. The composition of the stand resembles the last. Timber-line here occurs at about 6,000 feet.

There is no range for cattle, though horses can make a living, even in most winters, round Tete Jaune Cache.

CLEARWATER RIVER.

An area of 45,000 acres was reported on during 1912 in the North Thompson Valley at the mouth of the Clearwater River. The valley here is six to eight miles wide. The elevation runs from 1,200 to 2,000 feet, on the average. This district had been heavily burned; 38,400 acres were fire-swept. Only 5,000 acres remain on which the timber averages over 5,000 feet per acre. This is composed of fir and cedar. The burned area is restocking with fir, cedar, and hemlock. In such places there is limited grazing in the summer months.

ADAMS RIVER.

The valleys of Adams River and Louis Creek, together with the country lying east of Adams River to Seymour Creek, were examined in 1912. This country is very broken. The valleys are narrow and the mountains rough and steep. The elevation varies from 1,367 to 7,300 feet, and a large proportion of the country is above 5,500 feet. Forest fires have done great damage in the past; 242,000 acres have been burned over. The area of timber averaging over 5,000 feet per acre is only 8,000 acres, on which the stand is 30,000,000 feet. Practically all the area burned over is restocking. The stand consists of fir and cedar at the lower levels, spruce replaces the fir on the hillsides, and hemlock replaces the cedar at the higher levels. Tree-growth ceases at about 6,000 feet.

There is good summer grazing, as yet unused, on the mountain pastures above the tree-line.

NICOLA.

That portion of the Nicola country comprised in the watersheds of the Nicola River and its tributaries was surveyed in 1912. The total area covered was 448,000 acres. The country is marked by rolling plateaux, the elevation varying from 2,000 to 6,000 feet. Though this district is in the Dry Belt, only 67,000 acres have been burned over. On the burns there is a good reproduction of lodge-pole pine. The forest is open and park-like; there are only 29,000 acres of timber averaging over 5,000 feet per acre. The total stand in this area is 232,000,000

feet. The stand on the whole forest-area unburned aggregates 672,000,000 feet. It consists of yellow-pine in the drier localities and fir in the moister, with lodge-pole pine thickets at the higher levels; timber ceases at about 6,000 feet altitude.

Cattle-range is fair throughout in summer; in winter it is limited to the lower valleys.

OKANAGAN.

The watersheds of the Shuswap and headwaters of the Kettle Rivers were examined in 1912 and 1913. The area covered was 987,000 acres. This country is extremely hilly. The southern portion of the region consists of high plateaux lying at an elevation of 4,500 feet. The general elevation of the area covered varies from 1,000 to 5,250 feet. This district lies chiefly in the Dry Belt and has been badly burned, 658,000 acres being burned over. Fortunately there is an excellent reproduction of lodge-pole pine over the whole burned area. The virgin forest is open and park-like; there are only 22,500 acres in which the merchantable stand exceeds 5,000 feet per acre. The total stand on this area is 154,000,000 feet. The stand in the whole forest-area unburned aggregates 154,000,000 feet, and consists of fir, cedar, spruce, and some white-pine. Tree-growth ceases here at about 6,000 feet.

Cattle-range is fair in the more open forests, and is possible in the drier localities in winter.

COLUMBIA VALLEY.

An examination was made in 1912 of the timber resources of the Columbia Valley south from the Dominion Railway Belt to Vermilion Creek along the line of the Kootenay Central Railroad. The area covered was 56,000 acres. The valley-bottom is very level, the valley being flanked by mountains ten to fifteen miles apart and rising to an elevation of over 8,000 feet. Fires in the past have destroyed the timber on 26,000 acres. The remaining forest is very open, there being only 7.0 acres of timber averaging over 5,000 feet per acre. The total stand of timber on the area examined is estimated at 35,000,000 feet. It consists of Douglas fir, tamarack, and spruce, with cedar in the wetter places.

There is fair cattle-range throughout in summer, but the snowfall is too heavy to allow of it in winter.

EAST KOOTENAY.

The district lying west of the Kootenay River north to Fort Steele was examined in 1912 and 1913. The area covered was 387,000 acres. The greater part of the area covered consisted of broad and rolling river-benches in the valley of the Kootenay River. To the west of the valley the forest rises to the summit of Mount Baker, and other ranges of an elevation of 6,000 to 7,000 feet. About a third of this area, 138,000 acres, has been burned over. On the burned area there is an excellent reproduction of lodge-pole pine, with a small proportion of yellow-pine. The typical forest of this district is open yellow-pine, a large proportion of which, especially on the rolling benches, does not average over 5,000 feet per acre. There were in the area surveyed 64,000 acres averaging 5,000 feet or more per acre, carrying a total stand of merchantable timber amounting to 400,220,000 feet. The total amount of merchantable timber on the 387,000 acres examined is estimated to be 529,654,000 feet.

This is, generaly speaking, a very good cattle country; horses can remain out the whole year, and cattle have only to be fed for two or three months in winter.

SALMON RIVER.

A portion of the heavily forested valley of the Salmon River in Vancouver Island was cruised in 1912. The area actually covered was 128,000 acres. This valley varies in width from three to fifteen miles. The elevation ranges from a few feet above sea-level to 5,000 feet in the mountains which flank the valley. This valley, in common with the greater part of the forest in Vancouver Island, has escaped fire-damage. On 33,000 acres the timber averages over 8,000 feet per acre, the stand on this area being about 66,000,000 feet. The amount of merchantable timber on the 250,000 acres of the Salmon River watershed is estimated to be 3,000,000,000 feet.

The chief forest types here are mixed fir and cedar, hemlock and alder bottom. The most important types by far in this valley are the fir and cedar, which average over large areas over

20,000 feet per acre, consisting of 30 per cent fir, 20 per cent. cedar, and 20 per cent hemlock. This type is overmature, the trees being over 400 years old. Many individuals are among the largest and highest quality in British Columbia, reaching over 6 feet in diameter and 250 feet in height; this type covers the broad rich soil of the valley-bottom and extends on the slope to 2,500 feet in elevation. Above it is the hemlock type, in which hemlock, the most common tree, occurs in mixture with fir and cedar. The trees here are smaller, of a lower merchantable quality, and the average stand per acre varies from 5,000 to 10,000 feet. The alder-bottom type consists of alder 8 to 14 inches in diameter, occurring in dense stands in the thousands of acres of overflow lands in the river-bottom. Though the chief value of the valley at present is the timber which awaits a railroad, the land is excellently adapted for agriculture when cleared. At present there is little or no grazing for cattle.

NASS RIVER.

The valley of the Nass was surveyed in 1913 to a distance of 250 miles above the mouth of the river. This survey extended over to the Upper Skeena River and followed the Yukon Telegraph Trail 150 miles down to Hazelton. The area surveyed was 2,812,000 acres. There have been comparatively few fires in this region, 384,000 acres having been burned over. The whole of the burned-over area is restocking naturally with spruce, cedar, and hemlock in the lowlands in the south. North of the Cranberry River cedar is absent. At higher levels the young crop consists mainly of balsam and hemlock. Throughout on poor soils jack-pine is appearing.

This is one of the most heavily timbered regions which has yet been discovered by the Forest Branch. 824,000 acres averaging over 5,000 feet per acre. The total stand of merchantable timber in this area is 6,593,000,000 feet, practically all of which yet belongs to the Crown. Excepting 764,000 acres of barrens, consisting of areas above timber-line, high rock, snow-fields, and glaciers, the whole country is timbered with pulp-wood of the highest quality. The estimated quantity of merchantable timber in the area examined is 9,354,000,000 feet.

The Nass River heads in high mountains and flows for the greater part of its length through a wide rolling plain cut by slate ridges. At forty miles from the mouth it cuts across the Coast Range in a deep narrow valley.

The two important forest types of the region are the cedar, spruce, and hemlock type and the hemlock and balsam type. The cedar, spruce, and hemlock type forms the heaviest stands and the most valuable for lumber-production. It characterizes the Nass Valley to a point sixty-five miles above the mouth of the river. It is occasionally found in stands of 40,000 feet per acre. The average stand per acre is 5,000 feet. The chief tree is hemlock, which appears to best advantage on the Tseux watershed, where it reaches a diameter of 38 inches and height of 140 feet. The average dimensions are 24 inches and 100 feet. The other species, cedar and spruce, average 34 inches and 30 inches in diameter respectively. The hemlock and balsam type covers the country above an elevation of 2,000 feet. It is fitted admirably for pulp-wood, but would in places produce 5,000 feet of lumber per acre, and over large areas it will average 300 feet of lumber per acre, or 25 cords of pulp-wood. The chief tree in this type is hemlock, which reaches a height of 115 feet and diameter of 32 inches, and averages 90 feet in height and 24 inches in diameter. The average size of the balsam is 26 inches diameter and 100 feet height.

The Lower Nass Valley will be suitable for agriculture, chiefly for mixed farming. Hardy cereals and root-crops thrive. There is good summer grazing throughout, but the snowfall prevents any in winter.

CASSIAR.

Large portions of the valleys of the Babine, Driftwood, Omineca, Finlay, and Parsnip Rivers in the Cassiar District were examined in 1913. The area covered was 2,608,100 acres. Fire has destroyed large areas of valuable forest, three-quarters of the territory having been burned over, a total of 720,000 acres of timber having gone up in smoke. The area burned over is reforesting with jack-pine and poplar. Where it has not been burned, and excepting in barrens, this country is very well timbered. There are 465,175 acres of timber averaging over 5,000 feet to the acre, on which the total stand is 2,840,575,000 feet, practically all of which belongs to the Crown. The total stand of timber on the 4,075 square miles surveyed is 3,499,275,000 feet. The barrens cover 417,650 acres, and consist chiefly of mountains above timber-line, snow-

fields and bare ridges and summits bordering in altitude on timber-line. Timber-line here is at an elevation of 5,000 feet. The country covered by this survey is mountainous, cut by long narrow valleys, in many of which are lakes. The chief forest types are spruce, balsam, and jack-pine. The spruce types occur in the valleys and contain a mixture of spruce, jack-pine, and balsam. The maximum stand per acre is 10,000 feet. The average stand is 3,500 feet. The maximum development of spruce here is: Diameter, 30 inches; height 110 feet. The average size is: Diameter, 15 inches; height, 85 feet. The spruce type gives away at an elevation of 3,500 feet to balsam, which is the chief type on the hills. Occurring in mixture with the balsam are jack-pine and a few spruce. The average stand per acre of this type is 8 cords. The jack-pine type is found chiefly in the numerous rolling plateaux of this region, which lie at an elevation of 2,800 to 3,500 feet, and are marked by sand and gravelly soils. No species are mixed to any extent with the jack-pine. By jack-pine is meant *Pinus contorta*. No lodge-pole occurs in this region. The average stand per acre is 3,000 feet.

The timber in this region will not be developed for many years. It will come into the market with the development of transportation, and should be protected from fire for that reason. There will be but slight local demand for timber in this country, as the agricultural land is limited in area to the natural meadows in the larger valleys and a few areas around Tatla Lake. This land is suited for mixed farming.

BELLA COOLA.

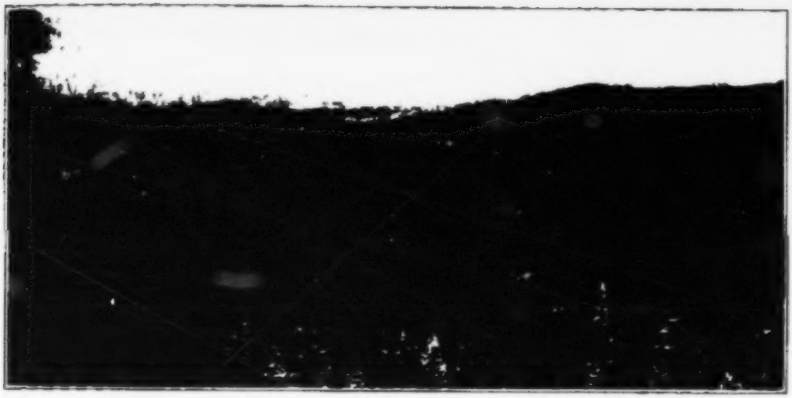
The country on each side of the 53rd parallel, from the 124th meridian west to the 126th meridian, including portions of the Bella Coola and Dean valleys, and covering the Tse-tsouti, Itcha, and Ilgachuz mountain ranges, was examined in 1913. The area examined was 1,728,000 acres. The greater portion of the area is a rolling or almost level volcanic plateau 3,000 feet above sea-level. The mountain-ranges mentioned rise to a height of almost 7,000 feet. The surveyed tract embraces the divides between the Dean and Fraser Rivers and the Dean and Blackwater Rivers.

The whole country has been very severely burned, less than a third of the forest having escaped fire. The area burned over is estimated at 1,280,000 acres. The burned-over area is reproducing naturally in lodge-pole pine. The new forest in 450,000 acres has already reached pole size. The forest is open and lightly timbered; only 640 acres were discovered averaging 5,000 feet per acre. There is estimated to be on the area examined 227,000,000 feet of merchantable timber.

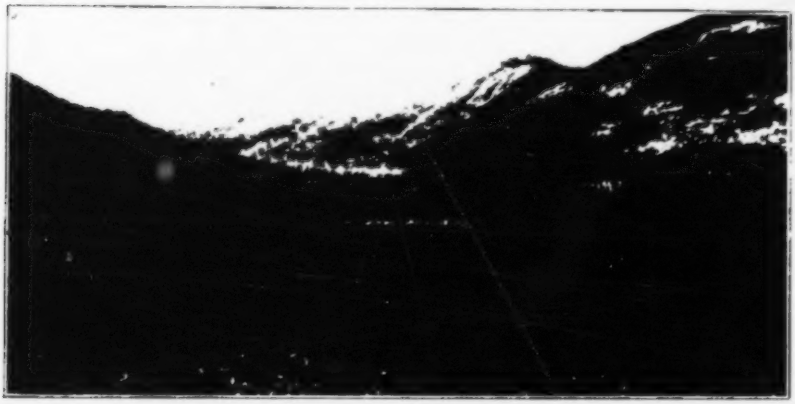
There are three important forest types—lodge-pole pine, mountain and spruce with poplar. The lodge-pole pine type is, because of the large area it covers, the most important economically. This type characterizes the extensive plateau of the district and does not occur below elevation of 2,000 feet in the deeper valleys, or above 6,000 feet on the mountain-slopes. The soil here is sandy, 3/8 inch deep, with basalt-rock subsoil. Lodge-pole forms 90 per cent. of the forest; the species in mixture are poplar and spruce. This type forms an open forest averaging 500 feet per acre. Lodge-pole pine here reaches a maximum development of 16 inches diameter and 90 feet height. The average size is 5 inches diameter and 60 feet height. This type will produce a stand valuable chiefly for poles, ties, and pulp-wood. The second type in importance is the spruce and poplar which clothes the deeper valley to an elevation of 2,500 feet, and covers possibly 10 per cent. of the area examined. The maximum stand per acre observed was 6,500 feet; the average stand is 1,500 feet. Spruce reaches a diameter of 10 to 30 inches, and poplar a diameter of 10 to 50 inches; the average heights are 80 feet and 70 feet respectively. The spruce referred to is the *Picea engelmanni*, and the poplar the *Populus balsamifera*. The proportion in which the species occur is: Spruce, 75 per cent., and poplar, 25 per cent.

An unimportant type from the standpoint of merchantable timber-production is the scrubby spruce, balsam, and white-bark pine, occurring on the mountains from an elevation of 5,000 feet to timber-line, which is at an elevation of 6,500 feet. The spruce referred to is *Picea mariana*, the balsam is *Abies lasiocarpa*, and the pine is *Pinus albicaulis*. The proportion in which they occur in this type is: Spruce, 50 per cent.; balsam, 30 per cent.; and pine, 20 per cent. This type affords valuable watershed protection, but produces no timber of possible merchantable importance. It forms 15 per cent. of the forested area.

Excepting possible minerals, the timber is the chief natural resource of this country. There is very little agricultural land. There are large areas of range available from three to four

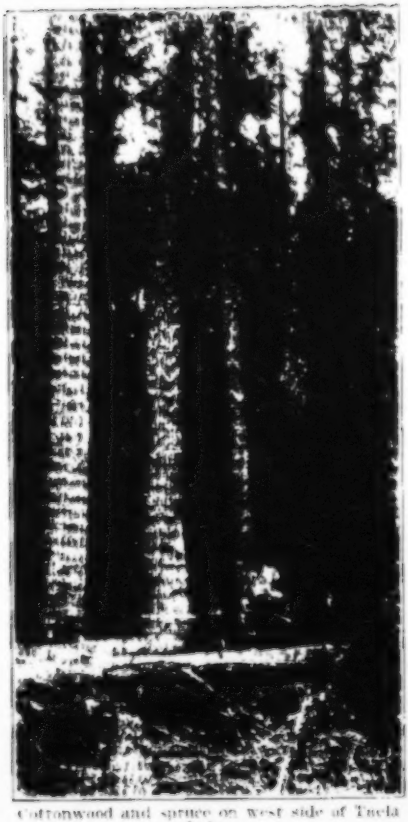


Spruce and poplar timber, Driftwood Valley, Omineca District.



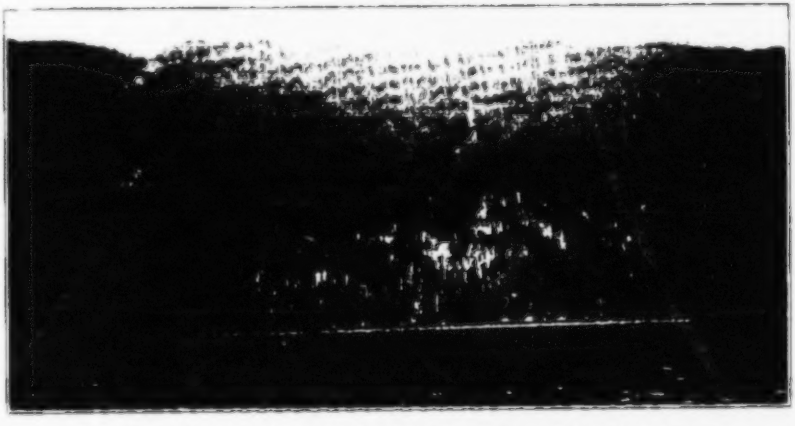
Meadow on the Ingenika Trail. Valley and lower slopes covered with spruce timber.

Mixed stand of spruce, pine, and poplar on shore of Qualcho Lake.



Cottonwood and spruce on west side of Tacla Lake.

Heavy spruce timber on Young Creek, Tacla Lake.



West side of Tacla Lake, showing dense stand of spruce timber.

months of the year. The forest is not so accessible. It compares favourably, however, with large areas of timber now considered valuable for tie and pulp-wood production in Ontario and Quebec.

NORTH THOMPSON.

The valley of the North Thompson River on either side of the line of the Canadian Northern Pacific from the Dominion Railway Belt north 147 miles to Thompson Crossing, and including the drainage of the Barriere River, was examined in 1913. The total area covered was 1,000,000 acres. A great proportion of this district is very rough. The main valley of the North Thompson varies in elevation from 1,200 feet at the Railway Belt to 2,500 feet at the Thompson Crossing. The valley is one to three miles wide. The mountains on either side rise to an elevation varying from 4,000 to 8,500 feet. The Barriere watershed is a succession of high ridges, between which are narrow valleys and lakes.

About one-half of the area examined, 544,000 acres, has been fire-swept. A natural regeneration of young timber, in which spruce is the most common species, covers 512,000 acres of the old burn. About 10 per cent. of the total area, 90,000 acres, is covered with timber averaging over 5,000 feet per acre. The total quantity of merchantable timber on this statutory timber land is 1,000,000,000 feet. There are on this district examined 288,000 acres of barrens, consisting of rocky mountain-slopes, areas above timber-line, which is here 6,000 feet, and old burns not reforested. The remainder of the valley is well timbered, the total stand in the whole region being 1,500,000,000 feet.

The three most important forest types of the Interior occur here—the mixed yellow-pine and Douglas fir of the Dry Belt, the cedar and spruce of the Northern Interior wet belt, and the spruce-hemlock of the high altitudes.

The yellow-pine and Douglas fir forest is the most important type of the Dry Belt. In the North Thompson Valley it extends to a point 100 miles north of the Railway Belt boundary, and reaches to an elevation of 3,000 feet on the mountain-sides. This forest is open; the maximum stand per acre is 10,000 feet; the average stand is about 4,500 feet per acre. The type is composed of 70 per cent. yellow-pine and 30 per cent. Douglas fir.

As the elevation or latitude increases, the proportion of Douglas fir increases. On the drier valley bottoms and slopes the forest becomes almost pure stands of yellow-pine. The maximum development of yellow-pine in this region is 100 feet high and 36 inches diameter. The average size is 90 feet in height and 18 inches diameter. Other species occurring in the type are lodge-pole pine, with occasional spruce and patches of cedar.

At the northern limit the yellow-pine and Douglas fir gives way to a forest of cedar and spruce, which is characteristic of a greater precipitation. This type clothes the valley with a dense forest to an elevation of about 4,500 feet, where the cedar is displaced by hemlock. The maximum stand per acre in this forest is 20,000 feet; the average is 10,000 feet. The forest is composed of 60 per cent. cedar and 40 per cent. spruce. Cedar reaches a maximum size of 44 inches diameter and height of 90 feet; the average dimensions are 26 inches diameter and 80 feet height. Spruce occurs to a diameter of 28 inches and height of 120 feet; it is usually found about 20 inches diameter and 90 feet height. Other important species found in the mixture are hemlock, with balsam on the flats. The cedar is very faulty on account of butt-rot. This type will produce a very large quantity of rough timber and very little high grade. The spruce and hemlock forest extending from an elevation of about 4,500 feet and timber-line at 6,000 feet is, except for watershed protection, of comparatively little economic importance at present.

The chief resource of the region is timber. The narrow valleys afford but little room for agriculture. There is four to eight months' valuable grazing, especially in the pine and fir forests. The timber, however, will, with the completion of the railroad and the expansion of markets, support a flourishing industry.

CANOE RIVER.

The valley of the Thompson River above Thompson Crossing and the valley of the Canoe River were surveyed in 1913. The area covered was 400,000 acres. The report for this work is not yet received. There were 32,500 acres on which the stand per acre exceeded 5,000 feet per acre, the aggregate being 325,000,000 feet. Aside from this, there was a still greater amount of merchantable timber.

LILLOOET.

Portions of the valleys of the Bonaparte and San Jose Rivers lying west of the 120th meridian and north of the Railway Belt were examined in 1913. The area covered was 3,000,000 acres. The fire-damage has been enormous: 2,400,000 acres, or four-fifths of the area, have been burned over. It is said that until a few years ago the Indians of the region burned the forest every year "to light the salmon up the Fraser River," as well as to improve hunting. There is an excellent reproduction of lodge-pole pine on all old burns. Even those forests of the region which have escaped fire are open, and average less than 5,000 feet per acre: 128,000 acres of timber were located which averaged over 5,000 feet per acre; on this area the stand of merchantable timber was 800,000,000 feet. The total stand of timber in the land covered by the survey is 1,200,000,000 feet. It is estimated that in this same area the loss by fire has been 2,400,000,000.

The area under discussion lies in a rolling plateau varying in elevation from 3,500 to 4,000 feet, cut by narrow river-valleys which drop to an elevation of 2,000 feet, and broken on the east by low irregular mountain-ranges which separate the plateau from the North Thompson Valley. There are here three forest types—the yellow-pine, Douglas fir, and lodge-pole pine. The most important type is lodge-pole pine, which covers approximately 80 per cent. of the whole region. Lodge-pole has succeeded in all old burns, and is the prevalent type above an elevation of 3,500 feet. The mature lodge-pole forests average 3,000 feet per acre. Yellow-pine occurs in practically pure open stand on the drier levels and rises to an elevation of 3,500 feet. It reaches its northern limit on the Bonaparte River. The maximum stand per acre is 5,000 feet; the average stand per acre is 2,000 feet. Douglas fir occurs in the valleys and in moist slopes to an elevation of 4,000 feet. It forms a comparatively small proportion of the forest in this region, and occurs pure and sometimes in mixture with yellow-pine and lodge-pole pine. The average stand per acre is 3,000 feet. The average development of Douglas fir here is: Height, 100 feet; diameter, 36 inches.

The timbers here up to an elevation of 4,000 feet will be chiefly valuable for the uses of the local population. Above that elevation is of value primarily for watershed protection. The greater portion of the plateau is suitable for such mixed farming as will accompany the use of the valuable and abundant range; the range is available nine months in the year. The best timber is in the agricultural land. All water in the country is needed for irrigation, and the timber must be protected for watershed protection.

SIMILKAMEEN.

The territory tributary to the Kettle Valley Railroad west of Okanagan Lake and north of the International Boundary was examined in 1913. The area examined was 700,000 acres. The northern portion of the region consists of a high plateau of about 4,200 feet in elevation, cut by deep valleys. The southern portion runs into the Cascade Range and is very mountainous, reaching an elevation of 7,250 feet. Fires have been particularly destructive in this region, approximately 582,000 acres, or 90 per cent. of the whole area examined, having been burned over. An area of 43,680 acres has been reported as bearing over 5,000 feet per acre, with a total stand of 303,200,000 feet. The grand total of the timber on the country explored is estimated at 569,200,000 feet.

There are three important types here—yellow-pine, Douglas fir, and spruce. Yellow-pine occurs in practically pure stand in the valleys to an elevation of 4,000 feet. The forest is very open, averaging 4,500 feet per acre. Douglas fir occurs in the slopes to an average elevation of 6,000 feet. Up to 4,500 feet it occurs in mixture with yellow-pine, and above 5,000 feet in mixture with spruce. The average stand per acre here is 3,000 feet. Spruce in which there is a small mixture of jack-pine occurs above 6,000 feet to timber-line at 7,000 feet. The forest is extremely valuable for protective purposes.

Timber is the most important resource in this country. The agricultural land existing on the benches adjoining Okanagan Lake and in the narrow valley-bottoms all requires irrigation. The protective forests in the watersheds is of the greatest importance for the conservation of the stream-flow. There will be produced here large quantities of lumber, the manufacture of which will be one of the most important industries of the region. Timber will always be required in connection with the development of the extensive mining operations of the district.

The forest-survey work already completed has placed the Forest Branch in possession of a large fund of extremely valuable information. To begin with, estimates of the enormous damage caused by forest fires are now possible. The greatest loss, of course, has been east of the Cascade Mountains. Out of 17,324,000 acres examined in detail by forest survey parties, 7,000,000 acres have been burned over, fire having destroyed in this small proportion of the Province within the past two generations 30,000,000,000 feet of timber. Since fire hazards are increasing with development of the country, it needs no argument to point out the importance of protecting the forests remaining.

Most fortunately for the future wealth of the Province, the forest is reproducing naturally in the areas burned over, and the proportion of land which is barren or destitute of tree-growth is very small. The natural forest reproduction in the areas which have been burned will be merchantable within two generations, and even though of coarse quality will prove more valuable, owing to the rise in value, than the crop now being logged. In fact, British Columbia is more blessed with a valuable natural regeneration of the forest than any other portion of Western America. Examination has shown that of 7,000,000 acres burned over, approximately 6,100,000 acres are reforesting with merchantable species.

The surveys so far have been carried out in areas where most of the timber is yet unalienated from the Crown, and they have discovered and located nearly 5,000,000 acres of statutory timber land, much of which will be available for timber-sales when made accessible by railroads, and will so produce considerable revenue.

The importance of the forest as the chief resource and source of support for the population in British Columbia has been borne out by these examinations. In every district it has been found that the greater portion of the acreage covered is most suitable for the production of timber, and that the most available and most important source of wealth was timber. The exploitation of the timber will in most instances hasten the settlement of the agricultural valleys. A most important result of the survey has been to show that in British Columbia we have measured and valued our timber by an altogether different standard from that current elsewhere in Canada. Close acquaintance with the big timber has caused us to place no value on many millions of acres of timber in the interior of the Province. Actual cruise shows that this timber forms a heavier stand per acre than the mixed spruce forests which now form the main support of the lumbering industry in the other Provinces from the Rocky Mountains to the Atlantic. Transportation will give this timber its true value in the interior of British Columbia, and if protected from fire it will eventually return a magnificent revenue to the Province.

An important duty of the Forest Branch parties has been the location of agricultural land. The boundaries of all tracts examined have been carefully located and the character of the land reported on in as great detail as possible, in order that the information may be placed in the hands of the Lands Department for prompt use in furthering settlement. The protection of the timber from fire and its marketing will be hastened by the extension of settlement.

The survey study of the forests of British Columbia, their extent, present timber-producing capacity, and future possibilities is a matter of almost as great importance to the Prairie Provinces of Canada as to British Columbia itself. It is believed that one-half the timber in Canada is in British Columbia. Certainly the population of the Prairies will for generations depend greatly upon the timber resources of this Province. During the past year representations were therefore made to the Dominion Conservation Commission which have resulted in gratifying co-operation between this body and the Forest Branch in completing the general survey of the forests of the Province; the Commission having appointed Dr. H. N. Whitford to assist in the completion of this work. The information secured by the Branch and by private individuals is being made available to the Conservation Commission, and a complete report will be published at the conclusion of the field-work in about two years.

FOREST RESERVES.

After a fuller consideration of the subject of the creation of forest reserves, it is felt that, considering the undeveloped state of the larger portion of the Province, it is not necessary at the present time to undertake the general establishment of forest reserves, since the protection from alienation of areas bearing a merchantable stand of timber is established by Statute, and

can be enforced by field examination of applications to purchase or pre-empt Crown lands in timbered districts. Moreover, the immense amount of administrative and protective work placed on the Forest Branch renders the delimitation of areas which should be included in permanent reserves impracticable at the present time.

Every effort, however, is being made to locate and report areas of statutory timber land, so that they may be fully protected from alienation. This is important also in order to protect purchasers and pre-emptors from incurring difficulty in obtaining title to their lands, since statutory timber lands may be innocently taken up, the locators being ignorant of the amount of timber standing on the land.

In accordance with this policy, District Foresters, as well as officers conducting reconnaissance surveys, report promptly any areas discovered which bear statutory stands of timber.

GRAZING.

The forage-crop which is produced under the forest or in openings in the timber is a most valuable and considerable resource of the Province, which, if managed properly, can be made a permanent source of wealth without detriment to forest-production. While some forage is found in all wooded lands, it can be utilized by domestic stock only where the forage-crop is of a suitable character, where it is accessible and fairly open, and when it is available in large quantities. Where these conditions are not present the forage-crop is of value only for wild game.

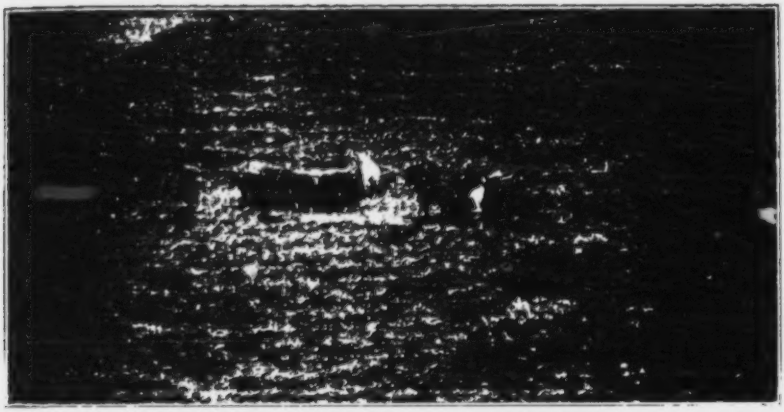
In British Columbia the areas, in which range, as non-agricultural land bearing forage is generally termed, capable of supporting domestic stock with profit occur, are confined entirely to the region east of the Cascades, and by far the greater proportion of this range lies in the Dry Belt, which is a strip of land 100 miles or less in width paralleling the Cascade range of mountains, and extending eastward along the International Boundary. East and north of this belt the timber becomes too dense to permit of running either cattle or sheep successfully, and then, too, the forage-plants are either lacking in nutrition or are not liked by domestic stock. Complete reports as to the location, area, and character of the range lands capable of being used by domestic stock have not yet been received, but preliminary investigations indicate that there is outside the Railway Belt approximately 17,500,000 acres of timbered land the larger portion of which affords grazing for a season of five to eight months, 2,000,000 acres of open range lands with a season of eight to ten months, and about 2,000,000 acres of high mountain-range land affording grazing for a period of from two to five months. This, of course, does not include the great areas of forage above timber-line known to occur in the northern portion of the Province which constitute the feeding-grounds of the caribou herds.

Cattle-ranging has been practised along the boundary, in the Okanagan, Similkameen, Nicola, Thompson, and Lillooet regions for several decades, but only where the conditions have been most favourable, and only a comparatively small portion of the range has been used.

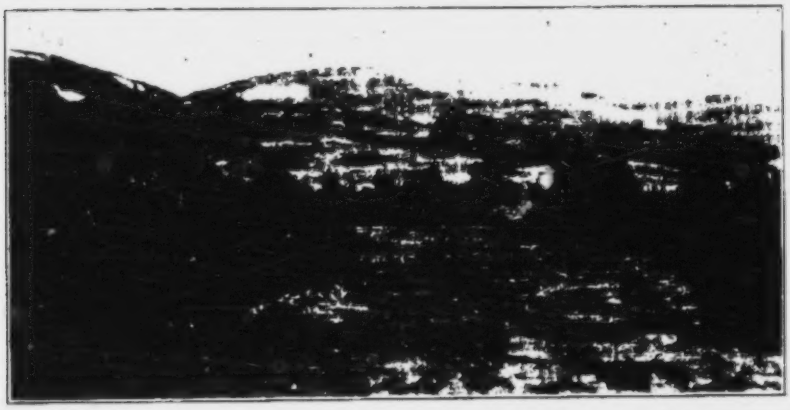
Reports by forest officers indicate that the total number of stock which are run on the open range do not at the present time exceed 60,000 head of cattle, 11,000 head of horses, and 7,000 head of sheep, while the number of owners does not reach 200. This range it is estimated will support for an average season of about eight months approximately 1,000,000 head of cattle. The stocking of these grazing lands to their carrying-capacity is one of the big problems before the Province, and one which, if solved, will make British Columbia an exporter instead of an importer of meat.

The dominant factor in the development of a permanent range live-stock industry is security in the right to use the range. Owing to the almost entire absence of winter range in the Province and long winters during which stock must be fed, a very considerable investment is required to enter the industry. First, land capable of producing hay must be obtained, cleared, placed under crop; often an irrigation or drainage system must be constructed; fences and buildings erected; horses and machinery purchased; and, lastly, cattle purchased to start the herd. Then, usually several years must elapse before an income is obtained from the sale of beef cattle.

As has been explained, so far only where the conditions have been very favourable has use been made of the range for stock-raising, and there has been more than enough range for all. With the opening of the range country by railways, however, there will be a great influx of



Range land, bunch-grass country in Lillooet District.



Alpine type: grazing lands at 6,000 feet altitude on Tom Creek Mountain.

Meadow land, capable of producing hay crops, in Lillooet District.

Camp in the cattle country.

Bunch-grass range in spruce and fir in Yalakom Game Reserve on Bridge River; elevation 4,000 feet.

Range country in the Lillooet District.

settlers with stock, and this will lead in a very few years to competition in the use of the range on the part of the stockmen. To prevent all trouble on this score, to secure each stockman in his range rights, and at the same time to protect the timber and forage from damage by overgrazing, a definite system of range control should be adopted. After a careful study of the local conditions and of the system of grazing control in use by the Dominion and United States Governments, it is recommended that the following regulations be put in force. These regulations in effect merely combine the provisions of the "Commonage Act" of 1897 (chapter 31, R.S.) and of the "Crown Lands Pasture Act" of the same year (chapter 130, R.S.). The latter Act provides authority for the promulgation of such regulations by Order in Council.

REGULATIONS RECOMMENDED.

1. Areas in which stock-grazing is to be allowed will be determined by the Minister of Lands, and divided into districts subject to his approval. The Minister of Lands will determine the kind of stock to be grazed in each district. When necessary for the protection of the water-supply, game, or forest reproduction, or for agricultural purposes, the Minister of Lands may exclude stock from areas determined by him and for such periods as he deems necessary.

2. All persons must secure permits before grazing any stock on public forest lands, except for those animals in actual use by prospectors, campers, and travellers, saddle, pack, and work animals actually used in caring for stock grazed under permit or in connection with the protection and administration of the forests, and stock owned by *bona-fide* settlers, not exceeding a total of ten head of cattle or horses and fifty head of sheep or goats.

3. Permits will be granted only by the Minister of Lands or by such officers of the Forest Branch as may be designated by him, and only for the exclusive use and benefit of the owners of the stock, and will be forfeited if sold or transferred in any manner or for any consideration. Permits will be cancelled or refused for intentional false statement of the number of stock owned or run.

4. In the allotment of grazing permits, first consideration will be given to small near-by owners and to other persons living near by who own improved ranches, and whose stock regularly graze upon public forest lands and who are dependent on its use for grazing purposes. Consideration will next be given to larger near-by owners, while the owners of transient stock will receive consideration last.

5. The forest officers designated by the Minister of Lands to handle grazing matters within the respective grazing districts will set and give public notice of a date on or before which all applications for grazing permits must be presented.

6. Grazing applications must not cover more stock than the applicant desires to graze, and must show the marks and brands of the stock, the locality in which pasturage is desired, and the grazing period.

7. *Bona-fide* settlers will be allowed to graze free of charge ten head of cattle or horses and fifty head of sheep or goats. For all stock grazed under permit a reasonable fee will be charged. This fee, which may be varied by the Minister of Lands, depending upon the advantages and location of the range and the length of the grazing season, will be per annum not less than 10 cents per head for cattle and horses and 2 cents per head for sheep and goats.

8. All grazing fees will be payable strictly in advance upon receipt by the applicant of notification that his application has been approved.

9. If the forest officer concerned so designates, any grazing permittee must provide means for the counting of his stock to be grazed.

10. Each person granted a grazing permit will be required to repair all damage to roads, trails, or fences caused by their presence on the range.

11. All persons holding grazing permits will be required to extinguish camp fires started by them or their employees, and to aid in extinguishing forest fires in the grazing district covered in whole or in part by their permit.

The whole subject of grazing is such an important and complicated one that it is felt a special pamphlet describing the methods of handling stock on the range and the character and location of the available range in the Province should be put before the public, and the material for such a treatise is now in preparation and will be issued before March 1st.

FOREST PROTECTION.

The year 1913 was unusually favourable throughout the Province as a whole during the fire season, May to September, inclusive. Precipitation was both generous and frequent, there being no prolonged dry spells. The spring fire season, which characterized the season of 1912 and caused most of the damage then, did not develop, although provision was made to meet it, should it occur, by the appointment in late April and early May of a large number of the Rangers and Guards.

In the forest districts of the Coast (and especially on the northern Coast) the season was exceptionally wet, and the fire-damage was almost negligible. The Interior forest districts

report also a season in general very helpful in fire-prevention. Vernon, Lillooet, and Kamloops experienced a dry April, and in all the Interior districts there were several rather dangerous, but fortunately short, dry spells during July and August, the exact periods differing with the respective districts. The hazardous conditions thus caused were, however, successfully met by strengthening the force during the critical periods and by taking increased precautions all round.

Permits for burning brush and slash were granted throughout almost the entire season. Only in a few cases was it necessary to cancel permits or refuse them, and then only for short periods.

The total number of fires reported—578—is much greater than last year, when only 347 were reported. This is due, however, partly to the fact that reports are more complete and reliable this year on account of improved organization. The large number of fires shows the danger present even in a favourable year, and the necessity of having an organization to control them. There is no question but that many of these fires, had they not been controlled, would have spread slowly or smouldered until favourable weather conditions arrived, when they would develop into devastating fires difficult and expensive to extinguish.

FIRE-PATROL FORCE.

The fire-protection staff for 1913 totalled in midsummer about 320 men, an increase of 50 per cent. over the total of 212 for 1912. The total area under administration is 150,000,000 acres, which is 25,000,000 acres or one-fifth greater than in 1912. The average area per man was about 470,000 acres, a decrease of 20 per cent. under the average area of 591,000 acres in 1912. The men are, of course, not distributed mathematically, but according to local conditions of hazard and communication.

The total cost of patrol alone was about $190,000, which is nearly 12 per cent. greater than the total of $170,000 in 1912. This means an average cost per acre of 1¼ mills or about ⅛ cent, as compared to 1⅛ mills or ⅐ cent in 1912.

The season began with a permanent staff of about thirty Rangers. The regular Guards and the Railway Patrolmen were placed on duty mostly in May, and the special Guards were added during the extra-dangerous periods in July and August. The District Wardens of 1912 correspond to the regular Guards of 1913. The average area per Warden in 1912 was about 847,000 acres, and per Guard in 1913 about 943,000 acres; the increase being due to the enlargement of the area patrolled from 125,000,000 to 150,000,000 acres. These figures represent the average unit patrol division, since the Rangers act in a supervisory capacity, each over several Guards' areas; the Railway Patrolmen cover only the comparatively narrow belt along the railways under construction; and the special Guards are in the nature of extra men employed as assistants to the regular Guards during the most hazardous portions of the summer.

FIRE-PATROL AREAS.

The following table compares the average patrol areas per man for British Columbia, the United States, and Ontario:—

Comparison Patrol Areas, Fire-protection Force.

Place.	Gross Administrative Area.	Total No. Men, Midsummer.	Acres per man.
	Acres.		
British Columbia—			
1912	125,000,000	212	591,090
1913	150,000,000	319	470,219
United States—			
1911	187,000,000	Over 3,100	60,000
1912	186,000,000	.....	.....
Ontario—			
Total, 1912	.....	900	.....
On six reserves, 1912	11,500,800	217	53,090

NOTE.—Figures for United States and Ontario taken from their annual reports for the years quoted.

The above table shows that the total fire-patrol force in the United States national forests (which have a gross area about 25 per cent. greater) in 1911 was over nine times greater and in Ontario in 1912 nearly three times greater than in British Columbia in 1913. The average patrol area per man in British Columbia in 1913 was nearly eight times greater than in the United States national forests in 1911, and over nine times greater than on the Ontario forest reserves in 1912. The United States Forest Service contains a much greater proportion of permanent employees than is the case of British Columbia, thus greatly increasing the cost of fire-protection. In 1911 it contained 1,393 Rangers, or more than forty-two times the number in British Columbia in 1913, while for the same years the proportion of regular Guards was about five to one respectively.

The average area per Ranger in British Columbia in 1913 was 4,545,454 acres, which is nearly thirty-four times greater than the average area per Ranger of 134,242 acres in the United States national forests in 1911. The average area per regular or five-months' Guard in British Columbia in 1913 was 943,396 acres, which is only about four times greater than the average area per regular Guard of about 240,000 acres in the United States national forests in 1911.

FOREST EXPENDITURE.

The following table compares the total and per acre expenditure on the forests of British Columbia, United States national forests, Quebec forest reserves, and Ontario forest reserves:—

Comparison of Expenditures on Forests.

Place.	Administration and Protection (including Cost of Patrol, Fire-fighting, and Permanent Improvements).	Per Acre.	Administration and Protection (excluding Permanent Improvements).	Per Acre.	Permanent Improvements.	Per Acre.
		Cents.		Cents.		Cents.
British Columbia—						
1912	$348,217	0.00278	$ 348,217	0.00278	.....	.....
1913	540,986	0.00364	440,444	0.0029	$100,542	0.00067
U. S. National Forests—						
1911	5,217,826	0.0279	4,718,668	0.0252	499,158	0.0027
1912	5,092,100	0.0272	4,621,275	0.0247	470,825	0.0025
Quebec—						
1909*	.....	.....	63,724	0.00057	.....	.....
1910*	.....	.....	94,268	0.00084	.....	.....
1911*	.....	.....	98,500	0.00088	.....	.....
Ontario—						
Total, 1912	.....	.....	327,473	.....	.....	.....
On six reserves, 1912†	.....	.....	74,881	0.00651	.....	.....

* 112,000,000 acres forest reserves. † 11,500,800 acres.

NOTE.—Figures for United States, Ontario, and Quebec taken from their annual reports for the years quoted.

Comparing the 1913 expenditure of British Columbia on administration (excluding permanent improvements), it is seen that (1) in the United States national forests, 1912, the total was over ten times greater; (2) in Quebec, 1911, the total was over four times less, and per acre over three times less; and (3) in Ontario, 1912, the total was one-third less, but for the forest reserves of that Province the per acre expenditure was more than double.

Comparing the expenditures on permanent improvements, the total in the United States, 1912, was less than five times that of British Columbia, 1913, while the per acre expenditure was only three times and a half greater than British Columbia. This shows what a relatively large amount of permanent improvement work was done by the British Columbia Forest Service during the past season.

FOREST FIRES, 1913.

The following table shows the fires which occurred during the past season, classified by districts and causes:—

Fires in British Columbia, 1913, classified by Causes and Forest Districts.

District.	Campers.	Railway Locomotives.	Unknown.	Railway Construction.	Smokers.	Lightning.	Uncontrolled Permit Fires.	Logging Railways.	Indians.	Donkey-engines.	Public Road Construction.	Started before Season.	Incendiary.	Traction-engine.	Burning Houses.	Clearing without Permit.	Steamboats.	Totals.	Per Cent.
Cranbrook	16	70	29	1	3	6	2	7	...	...	...	1	...	...	...	...	...	135	23.3
Ft. George	12	...	7	5	5	...	2	...	3	...	1	...	...	1	...	...	1	35	6.0
Hazelton	8	...	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	19	3.3
Island	12	1	10	1	5	...	2	...	2	3	4	...	5	...	3	...	2	52	9.0
Kamloops	54	...	5	24	...	6	1	...	1	...	...	1	...	...	...	...	...	96	16.6
Lillooet	130	...	3	3	...	...	...	...	1	...	...	1	...	...	...	...	...	26	4.5
Nelson	5	32	9	...	5	9	4	...	2	...	2	1	2	...	...	2	...	74	12.8
Prince Rupert	3	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	0.9
Tete Jaune	7	3	4	9	2	1	...	...	...	...	...	...	...	...	...	...	...	27	4.7
Vancouver	7	1	9	6	2	3	...	7	1	6	1	...	...	...	...	...	...	42	7.3
Vernon	11	3	15	15	9	10	...	...	1	...	2	1	...	...	...	...	...	67	11.6
Totals	148	110	204	62	35	34	17	14	12	10	9	7	7	1	3	2	3	578	100.0
Per cent.	25.6	19.0	18.0	10.7	6.1	5.9	3.0	2.4	2.1	1.7	1.6	1.2	1.2	0.2	0.5	0.3	0.5	100	...

FOREST-FIRE DAMAGE.

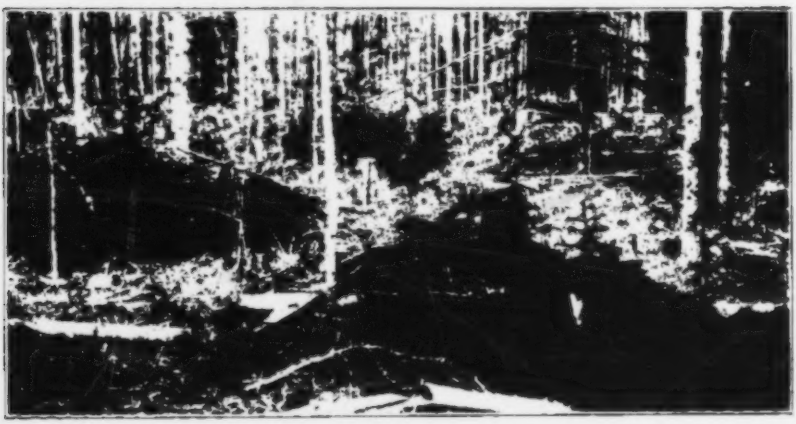
Damage caused by Forest Fires in British Columbia, by Classes and Forest Districts.

DISTRICT.	Damage to Standing Timber.					Other Areas burned over (no Damage).	Total Area burned over in Province.	Damage to other Forms of Property.				Grand Totals.	Per Cent.
	Merchantable Timber.			Valuable Second Growth.									
	Area burned over.	Volume.	Value.	Area burned over.	Value.			Forest Products.	Campers' Equipment.	Buildings.	Railway and Logging Equipment.		
	Acres.	F.B.M.		Acres.		Acres.	Acres.						
Cranbrook	65	42,000	$ 84	91	$100	...	156	$10,974	...	$ 300	$100	$11,558.00	63.0
Fort George	8	28,000	70	...	...	62	70	75	...	270	...	421.00	2.3
Hazelton	...	...	...	600	100	151	751	...	$18 25	...	...	118.25	0.6
Island	...	...	...	...	...	800	800	125	...	...	...	125.00	0.7
Kamloops	1,130	175,000	175	508	100	...	1,638	...	...	600	...	875.00	4.8
Lillooet	670	85,000	85	11	2	484	954	...	...	40	...	87.00	0.5
Nelson	135	1,250,000	1,250	...	...	158	293	...	70.00	180	...	1,500.00	8.2
Prince Rupert	...	...	...	1	...	14	15	700	...	...	...	700.00	3.8
Tete Jaune	2,322	1,670,000	1,300	670	100	...	2,992	...	...	...	25	2,025.00	11.0
Vancouver	15	40,000	50	17	5	706	859	210	...	70	100	435.00	2.3
Vernon	1,061	805,000	400	202	20	2	1,865	...	10.00	100	...	330.00	3.0
Totals	5,835	3,895,000	$3,900	1,900	$427	2,535	10,270	$12,084	$98.25	$1,560	$225	$18,354.25	100.0
Per cent.	56.7	100	21.6	18.6	2.3	24.7	100	65.9	0.5	8.5	1.2	100	...

The total damage caused by fire was only $18,354 as against $313,273 in 1912. The damage to standing forest was only $4,387 as against $200,000 last year. Fires covered and damaged to a greater or less extent less than 6,000 acres of merchantable timber and 2,000 acres of valuable second growth; 2,535 acres of slash was also burned, making a total of 10,270 acres, as against over 150,000 last year. The damage to other forms of property totalled only $13,967.25, as against $113,273 last year. Over 60 per cent. of this was due to a single fire in Cranbrook District which destroyed a large quantity of saw-logs on skidways.

Dangerous slash left along main road, Kamloops District.

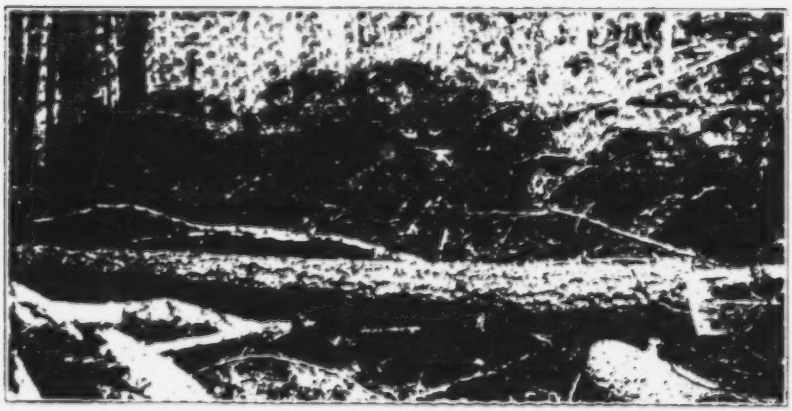
A good burn along road, Kamloops District.



Brush-piling on Railway Permit at Mile 59, G.T.P. Ry.

Burning slash on right-of-way of Kettle Valley Railway.

Satisfactory spring burn of logging slash in Fernie District.



Slash and logs on the North Thompson. A bad fire-trap.

FIRE-FIGHTING.

Fires in British Columbia, 1913, classified by Area, Cost of Fighting, and Forest Districts.

District.	Total Fires.		Total Area burned over.		Number less than ¼ Acres.	Number ¼ Acres to 10 Acres.	Number over 10 Acres.	Total Fires costing Money to fight		Total Expense fighting Fires.	
	No.	%	Acres.	%				No.	%	$	%
Cranbrook	145	23.3	156	1.6	118	15	2	12	7.6	865.00	9.7
Fort George	35	6.0	70	0.7	13	18	4	24	15.2	1,785.00	20.0
Hazelton	18	3.5	531	5.2	.....	15	4	6	3.8	122.55	1.4
Island	52	9.0	906	8.7	15	23	14	21	13.3	978.00	10.5
Kamloops	96	16.6	1,658	16.0	72	20	4	11	7.0	503.00	5.7
Lillooet	26	4.5	954	9.3	9	15	2	5	3.1	84.00	0.9
Nelson	74	12.8	286	2.9	34	26	14	22	13.9	1,895.56	20.6
Prince Rupert	5	0.9	15	0.1	.....	5	.....	3	1.9	68.00	0.8
Tete Jaune	27	4.7	2,992	29.1	3	13	11	11	7.0	1,400.00	16.5
Vancouver	42	7.3	830	8.1	8	24	10	19	12.0	297.00	3.1
Vernon	67	11.6	1,885	18.4	27	26	14	24	15.2	992.00	10.8
Totals	578	100.0	10,270	100.0	299	300	79	158	100.0	8,939.11	100.0
Per cent. of total	100	.....	.....	.....	51.7	34.6	13.7	27.3	.....	.....	.....

The above table shows, it is felt, a distinct advance in the effectiveness of the fire-protection work during the past season. The total number of fires this year was 578, as against only 347 in 1912. But the total area burned over this year was only 10,270 acres, as against over 158,000 in 1912. The total expense to the Government for fire-fighting was only $8,930 as against nearly $30,000 last year. Of the 578 fires, 420, or about three out of every four, were extinguished by the regular force without extra expense. To extinguish the remaining 158 cost an average of only $56.50 per fire. About 300 fires, or over half the total, were discovered and extinguished while incipient, and only 79 fires, or less than 14 per cent. attained serious proportions before being extinguished.

THE FIRE HAZARD.

In 1912 the chief four causes were: (1) Unknown, 149; (2) fires started before season, 39; (3) campers, 38; (4) railway locomotives, 34. Altogether these causes contributed 260, or 75 per cent. of the total 347 fires.

In 1913 the chief four causes were, as shown above: (1) Campers, 148; (2) railway locomotives, 110; (3) unknown, 104; (4) railway-construction, 62. Altogether they contributed 424, or nearly 75 per cent. of the total 578 fires.

CAMP-FIRES.

Camp-fires were responsible for 148, or nearly a quarter of the total fires, which is considerably more than any other single cause. There is no doubt also that a large number of the unknown class are really camp-fires. Much of the camping is associated with the railway-construction now being so actively carried on in every forest district. Especially is this true along the lines of the Canadian Northern Railway and the Grand Trunk Pacific, on the Fraser and North Thompson Rivers, where a constant stream of men is moving all summer. A great many of these men are foreigners, unable to read or speak English, and careless or ignorant, or both, of the great value of the forests, of the tremendous fire hazards which they create, and of the laws of the Province relating to fire-protection.

Considered from this standpoint, the number of fires due to campers and railway-construction is really small, and is a tribute to the effectiveness of the patrol maintained by the Rangers and Guards.

Theoretically, camp-fires should never cause a forest fire, as it is only through carelessness they are dangerous. Practically, however, they are a very serious source of trouble, causing in 1913 nearly a quarter of all fires—more than any other single factor. The danger from camp-fires is due to the fact that every one who travels in the woods requires fire for heat, light, warmth, and insect-smudges, and consequently they are made in inaccessible regions as well as along the regular routes of travel. This makes the matter of patrol more difficult, makes intensive patrol impossible, and makes it absolutely necessary that all people who travel through

the Province may be made to realize their presence in the bush is a constant menace, and that a little carelessness on their part, or poor judgment as to the safety of their camp-fire, may result in the destruction of thousands of dollars' worth of timber and cause the Government heavy and, but for their carelessness, entirely unnecessary expense in putting the fire out. Such carelessness can only be eliminated by education of the public, and next spring an energetic campaign will be inaugurated to bring before every person in the Province his personal obligation to assist the Government in preventing fires. This campaign will consist of newspaper items, posters, and other methods which will reach and keep present before the public the forest-fire hazard. Something in this line was attempted this season when posters of several kinds were put up throughout the Province, one of them reading as follows:—

CAMPERS AND TRAVELLERS.

DON'T START A FOREST FIRE.

You can make certain that you do not start one by observing the following six rules:—

(1.) Be sure your match is out before you throw it away:

(2.) Knock out your pipe-ashes or throw away your cigar or cigarette stump where there is nothing to catch fire:

(3.) Don't build a camp-fire any larger than is absolutely necessary. Never leave it, even for a short time, without putting it out with water or earth:

(4.) Don't build a camp-fire against a tree or log. Build a small one where you can scrape away the needles, leaves, or grass from all sides of it:

(5.) Don't build bonfires. The wind may come up at any time and start a fire which you cannot control:

(6.) If you discover a fire, put it out if possible; if you can't, get word of it to the nearest Forest Ranger or Fire Warden as quickly as you possibly can.

Prove that you are a good woodsman by learning these rules and carrying them out in practice.

WM. R. ROSS,
Minister of Lands.

Another poster, the text of which follows, giving a summary of the general regulations of the "Forest Act," was printed and posted all over the Province in order to apprise the general public of the provisions of the "Forest Act" with respect to forest fire prevention and suppression:—

FIRE LAW, 1913.

DURING THE CLOSE SEASON, MAY 1ST TO OCTOBER 1ST.

PERMITS.—A permit must be obtained for every clearing fire near any forest or woodland, every open burner, and every fire for industrial purposes. Apply to your District Fire Warden when you need a permit.

CAMP-FIRES.—All inflammable material must be cleared away for 3 feet in every direction from the edge of every camp-fire; and every such fire must be TOTALLY extinguished before the person making it leaves the place.

SMOKING.—Lighted matches and burning tobacco, before being thrown away, must be thoroughly extinguished.

BRUSH AND SLASHINGS.—(1.) Persons causing any accumulations of inflammable debris within 200 feet of any public railway must dispose of the same under direction from the District Fire Warden.

(2.) Persons clearing rights-of-way for any purpose must dispose of all debris under directions from the District Fire Warden.

(3.) The Fire Warden may require debris to be cleared away from around any camp, mine, open burner, or sawmill.

(4.) Dangerous accumulations of debris may be declared a public nuisance.

LOGGING OPERATIONS.—*See* Regulations.

ENGINES.—Any wood- or coal-burning engine operated near any forest or woodland must be fitted with efficient devices for preventing the escape of fire.

FIGHTING FIRE.—Able-bodied citizens must help in fighting forest fires when called upon by a duly authorized officer.

PENALTY FOR VIOLATION OF THE PROVINCIAL FOREST FIRE LAW.—$50 to $300.

PENALTY FOR VIOLATION OF THE CRIMINAL LAW.—Up to fourteen years' imprisonment for wilfully setting fire to any forest or woodland; up to seven years for wilfully attempting to do so; up to two years for negligence and recklessness in setting fire or for violation of the Provincial Fire Law.

WM. R. ROSS,
Minister of Lands.

LOGGING OPERATIONS.

While a few fires occurred from logging operations which required the expenditure of money to extinguish, they did practically no damage, being confined to cut-over land. This favourable condition is due almost entirely to the determined and organized efforts of the loggers to eliminate the fire-danger from their camps. Many operators issued instructions to govern their employees, both in the prevention of fires and in their extinguishment in the event of their occurrence. With such co-operation from the loggers in the matter of fire prevention and suppression as was received this year, the fire hazard in logging camps will not be difficult to control. Systematic inspection of the camp by Rangers and Guards will, however, be continued, since such inspections assist the foremen in enforcing their rules. A poster, which is printed below, giving in condensed form the regulations adopted by the Forest Board for the prevention of fires due to logging operations, was posted in all camps:—

LOGGING OPERATIONS.

PREVENTION OF FOREST FIRES DURING THE CLOSE SEASON.

ENGINES.—Every donkey-engine and locomotive must be equipped with an efficient SPARK-ARRESTER and with devices which will prevent the escape of fire from ASH-PANS and FIRE-BOXES.

ASHES AND COALS.—ASH-PANS and FIRE-BOXES must not be emptied while locomotives are in motion. ASHES and COALS taken from ASH-PANS and FIRE-BOXES of locomotives and donkey-engines must be immediately extinguished with water, or placed in a safe pit, or on a spot of bare ground.

FIRE-FIGHTING TOOLS.—Every donkey-engine and locomotive must be provided with a sufficient supply of water and with a pump capable of forcing water to a height of 25 feet, 150 feet of hose, 6 ten-quart buckets, 6 shovels, 3 axes, 3 mattocks, all in good repair for fire-fighting purposes.

SNAGS.—All dead trees and snags within 200 feet of any donkey-engine at work must be felled.

WATCHMEN.—A watchman must be kept on duty at every donkey-engine under fire during the NOON HOUR and TWO HOURS after operations have ceased for the day.

CAMPS.—A sufficient space around all camp buildings must be cleared of brush and other fine combustible material.

SMOKING.—Lighted matches, cigars, cigarettes, and pipe-ashes must be completely extinguished before being thrown away.

RESPONSIBILITY.—Foremen, engineers, and all men working in the woods, as well as contractors, operators, and owners, are responsible for the carrying-out of these regulations.

WM. R. ROSS,
Minister of Lands.

LIGHTNING.

During the past season lightning caused 34, or about 6 per cent. of all fires, as against 6.6 per cent. in 1912. There are certain well-defined lightning zones in the Province, notably in the Interior dry belts, where lightning is frequently not followed by rain. In the Kamloops Forest District there is a broad belt about fifty miles wide extending south-east from Clearwater and Mahood Lakes, especially liable to lightning fires. The same conditions hold in the drier portions of Cranbrook, Nelson, Vernon, and Lillooet Districts. While this is perhaps the one cause of fire which is absolutely unavoidable, the danger can be successfully met by an adequate system of look-out stations and patrol, so that the fires may be discovered and suppressed before they become large. A start has already been made in this connection. A number of natural look-out stations have been made easily accessible by trails and connected by telephone with the nearest source of labour and supplies. A large number in addition have been selected and will be improved as rapidly as possible.

SMOKERS.

Carelessness on the part of smokers with matches and burning tobacco caused about 2 per cent. of the fires in 1912, and 35, or 6.1 per cent., in 1913. This is a cause which, like camp-fires, can only be removed by educating the public. Suggestions that a law be passed making smoking in the woods punishable by fine have been received, but it is felt that such an Act would be impossible to enforce, and that the educational method should be given a thorough trial before attempting compulsory legislation.

VIOLATIONS OF THE FIRE-PROTECTIVE PROVISIONS OF THE "FOREST ACT."

The enforcement by the Government of the provisions of the "Forest Act" with respect to fire, since they were first incorporated in the Statutes, has resulted in wide and general knowledge, and a growing spirit of co-operation on the part of the public concerning them. As a result, during the past year there were practically no violations and only one prosecution. This was in part due also to the efforts of the forest officers to give prompt service to the public in the matter of issuing burning permits, so that there would be no excuse for violating this particular provision, which has always been the cause for most of the infractions. With an efficient and ample force there should be no excuse for burning without a permit, and the experience of this year shows that if one is provided no trouble from this source will be met with.

I am glad to report that no cases of incendiarism were discovered.

BURNING PERMITS.

A burning permit is written authority from an officer of the Forest Branch to use a fire for land-clearing purposes on a specified place and within a specified number of days. The "Forest Act" provides that permits must be obtained for land-clearing by fire during the close season, May 1st to October 1st. This means all land-clearing and brush-burning for whatever purpose, whether for agriculture, logging-slash, railway or other rights-of-way, public roads, etc. (In order to facilitate brush-burning on public roads, authority was delegated this summer to Road Superintendents to issue permits to Road Foremen.)

The following table shows for each forest district and for the whole Province the number of burning permits issued, the area they covered, and the periods for which the individual permits were granted:—

BURNING PERMITS ISSUED BY OFFICERS OF THE FOREST BRANCH DURING 1913 FOR CLEARING.

Districts.	Agric. Land.		Logging-slash.		Ry. Right-of-way.		Public Road.		Total.		Period.
	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	Days.
Cranbrook	615	900	88	1,100	34	100	.....	.....	737	2,100	Av. 10.
Fort George	391	580	.....	.....	70	1,506	.....	.....	461	2,086	3-30; av. 15.
Hazelton	456	500	3	75	.....	.....	.....	.....	459	575	Up to 30; av. 10.
Island	1,853	3,700	12	4,325	60	1,000	.....	.....	1,925	9,025	10-30.
Kamloops	548	350	.....	.....	96	432	.....	.....	644	782	Av. 14.
Lillooet	110	500	3	60	21	250	.....	.....	140	810	4-30.
Nelson	2,740	2,700	2	2	.....	.....	.....	.....	2,742	2,702	7-15.
Prince Rupert	274	500	.....	.....	.....	.....	.....	.....	274	500	7-30; av. 14.
Tete Jaune	16	40	.....	.....	85	2,174	.....	.....	101	2,214	4-7; av. 4½.
Vancouver	5,822	2,911	35	773	18	674	.....	.....	5,875	4,558	Up to 30; av. 10.
Vernon	617	3,823	19	1,320	98	447	55	250	789	5,840	6-30.
Total	11,250	16,493	157	7,655	458	6,813	55	250	11,925	31,102	
Per cent.	94.7	52.7	1.2	24.6	3.7	21.9	0.4	0.8	100	100	

Inspection of the above table shows that, of all permits issued, those for farm-clearing comprised nearly 95 per cent. of the total number and over half the total area. Permits for burning logging-slash and for railway right-of-way naturally covered a much larger area per permit than did those for clearing farm land. This is shown by the fact that, while in number these permits included only about 5 per cent. of the total, in area they covered nearly half the total.

Almost one-third of the total number of permits were in Vancouver District for land-clearing, chiefly in the Lower Fraser Valley. Nearly one-sixth of the total were issued in the Island District for land-clearing, chiefly on the Saanich Peninsula.

The permit law has a very close relation in British Columbia with many forms of industrial activity. Practically the whole of the Province (or at least such portions of it as will ever be used for man's purposes) is covered with a forest-growth of some kind. Therefore land-clearing is now, and for years to come will be, necessarily and desirably an important activity in the Province.

Land-clearing is at the best an expensive proposition. Too often there is no market for the wood. In every case there is brush to be disposed of. Fire is the only method of disposal, and weather conditions determine largely the safety, practicability, and success of the use of fire. If too wet it is difficult and costly to burn. If too dry there is serious danger of causing a forest fire by burning brush. But the settler must get his land cleared for crop-production, is anxious to do it as soon as possible, chafes under delay, and sometimes, perhaps, regards with indifference or hostility the forest surrounding him. The law provides that slash caused by right-of-way clearing for railroads must be burned, in order that it may not remain as a hazard to the forest through which the railway passes. But right-of-way clearing is all done by contract, and some contractors, in their efforts to do the work cheaply, neglect measures to safeguard the timber. The temptation, both in the case of those who wish to burn and those who are obliged by law to burn, is to take a chance and do it during dry weather, when burning is easy. This explains the necessity of supervision, by the organization entrusted with the protection of the forests, of brush-burning during the summer. Needless to say, the Forest Branch is only too anxious to handle the permit system so as to assist in every way those who are engaged in development-work in the Province.

In the average season there are probably not more than thirty days during which fires are apt to become uncontrollable. If no fires are burning in dangerous places during such weather, then the danger is limited to such fires as may be accidentally set. The permit system thus limits the necessary fires to the safe season, and ensures their extinction, instead of allowing them to smoulder on until conditions are ripe for a general conflagration. Effective fire-protection, consequently, is very largely dependent on the control of land-clearing fires during the hazardous periods of the year.

The system of issuing permits must be such as to enable those desiring them to take advantage of weather conditions favourable to burning. It must be handled by a force sufficiently large to cover the country in reasonable short periods, because permits, as a rule, are issued only after personal inspection of the specified area by the issuing officer. Further, men entrusted with authority to issue permits must be men of experience and sound judgment and familiar with local conditions.

Instructions were issued by each District Forester to the Forest Guards regarding the policy to be followed in granting permits. The governing factors are the weather conditions, the surroundings, and the time which must elapse before the Forest Guard can pay a second visit to the place. Permits were in only a few cases granted without personal examination, and then only in places of small risk. Sometimes, for instance, the district office would issue permits to save time for the applicants, but the local Guard would be at once notified, and instructed to inspect the area immediately. In every case the man on the ground has authority to cancel permits when, in his opinion, it is necessary. As is shown in the preceding table, the periods for permits varied from three to thirty days, averaging generally one to two weeks. Long-period permits are granted in the early and late portions of the close season, when the hazard is not especially great. During the dry periods in July and August, however, the period is shortened to the limit, or refused altogether. At the discretion of the District Foresters, all permits may be summarily cancelled for such time as is necessary during a dry spell. This action was found needful only in a few cases during the past season.

The comparative fire hazards of 1913 and 1910—the first a year of very small and the second of very great fire damage—is shown by the fact that in 1913 permits were only exceptionally refused, while in 1910 there were 903 refused, which meant nearly one refused for every four of the 3,901 issued.

The policy to be followed in issuing permits for burning logging-slash is governed by the same principles as in agricultural permits, except that greater care is necessary because of the greater area involved, and because the slash is, as a rule, in close proximity to or in the midst of green forest. The great benefits derivable from slash-burning are reduction of fire hazard and, especially on the Coast, the causing of favourable conditions for a good reproduction of Douglas fir (which reproduces best on a mineral soil with plenty of light). On account of its value, the Forest Branch has endeavoured to persuade the logging operators to adopt generally, both in the close season and out of it, this form of fire insurance and forest regeneration, with, on the whole, encouraging results. There is a growing sentiment among the timbermen in favour of the measure, both as a matter of self-interest and as a form of co-operation in forest-protection.

This is shown by the fact that over 7,500 acres of slash was burned over during the permit season, which, added to the area burned over before the season began, gives a total area of somewhere between 10,000 and 15,000 acres.

Many operators have expressed their intention of adopting the practice of annual burning of their slash, and it is expected that a much larger area will be burned over next year.

Following is an extract from a circular letter which was sent to the lumbermen of the Province in this connection last spring. A second letter of a similar character was sent out at the end of the fire season, urging the timber-owners to undertake full burning:—

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA,
FOREST BRANCH (LANDS DEPARTMENT), May 1st, 1913.

DEAR SIR,—I wish to request for the Forest Branch your earnest co-operation in an effort to solve the problem of the disposal of the slash resulting from logging operations.

Owing to the great density of the timber stands on the Coast and in portions of the Interior of British Columbia, to the conditions surrounding the lumber industry which permit of the removal from the woods of only a very small proportion of the stand, and to the methods of logging, the amount of slash remaining after logging is excessive. Generally, also, the timber remaining after logging is without further value, and, since the slash effectually prevents the growth of a valuable second crop, slash must be removed first if the land is to be utilized in producing another crop of timber.

I need not point out that by far the greater portion of the land in British Columbia is, owing to its roughness and lack of soil, unsuited for agriculture, and the only possible way in which it can be made a steady source of wealth is by the growing of timber. Besides its effect in preventing the production of a second crop of timber, slash is universally recognized as the most serious of all fire hazards, and that it is only a question of time before every slash-area will be set on fire. This being the case, the evident thing to do is to burn the slash at such a time and under such conditions as will, so far as is humanly possible to determine, render it certain that the fire does not spread to adjoining timber.

The "Forest Act" of British Columbia does not make the burning of slash compulsory, although in the States of Oregon and Washington, where the conditions are identical, such laws are in effect. The "Forest Act" does, however, empower the Minister of Lands or the Forest Board to require owners to construct a safe fire-break about any area of slash, and where necessary to protect valuable timber this provision of the Act will be enforced.

To be at all safe or effective against July or August fires, fire-breaks must consist of a strip 5 to 10 feet wide cleared to mineral earth, and a strip 10 to 20 feet wide cleared of brush, inside which all dead snags standing within a distance of 100 feet must be felled.

As long as the slash remains, however, the danger from fire is still serious, and it is felt that it would be far better to burn the slash itself than to construct such fire-breaks, the cost of which is as much or more than that of slash-burning.

A number of loggers in British Columbia have already adopted the practice of slash-burning their slash every year, either in the spring or in the fall, and I hope that you will decide to apply the plan to your operations and take up the matter immediately with your superintendent. The present spring is backward, and except in high winds slash-burning may be safely carried on until the first or second week in June. During April no permit to burn is required, and after May 1st permits can be obtained from the local forest officers. While it is impossible to specify the conditions as to weather when burning can be done safely, or the methods by which the burning can be most effectively accomplished, these matters being best determined by your superintendent, the following general rules may be of assistance:—

(1.) Always construct a trail or a light fire-break around the slashed area before starting fires. This will serve to confine the fire and also permit men to get around the fire quickly.

(2.) Be sure and have enough men on hand when you start a fire to control the fire if it threatens to spread beyond the slash.

(3.) Never start a fire in the morning unless you feel certain a strong wind will not arise. The best time to start a fire is after 4 o'clock in the afternoon on a calm day; if the weather is warm and the slash dry, all the better.

(4.) If the slash-area is surrounded by timber, start fire first on the leeward side if there is a breeze, or on the uphill side if on a slope. When the danger of fire spreading beyond the area to be burned is past, set fire on the windward side or at the base of the slope; also whenever possible take advantage of a breeze blowing away from green timber.

(5.) Burn over the area as quickly as possible. This can be done by starting fires in a large number of places.

(6.) Keep a watchman on the area burned until all fires are out. Cut down any snags which may be burning. All fires should be completely out before June 15th.

Experience has shown that slash can be burned safely at the cost of 5 to 20 cents an acre, and that this expense is fully repaid by the resulting added safety of the camps, equipment, and surrounding timber. The cost can be materially reduced if the policy of annual burning is definitely adopted, since by a little forethought the superintendent and foreman can arrange to have drag and skid roads serve as fire-breaks. When it is known where the boundary of an area to be burned will lay, it is also a material help to have the trees felled away from the green timber.

A secondary but very real benefit of the permit system lies in its educational effect. A great many people become familiar in this way with the Government regulations relating to fire protection, and with the aims and objects of the Government in administering and protecting the forests of the Province.

In conclusion, it is gratifying to report that in most of the districts no complaints, and in the balance very few, were received regarding the conduct of the permit system by the Forest Branch. The field officers have met with the heartiest co-operation in the great majority of cases from the settlers, the logging operators, the railway contractors, etc., during the past season. Referring to table of "Fires in British Columbia, 1913," only two forest fires, or $^{1}/_{10}$ of 1 per cent. of the total number, were due to burning without permit, and only seventeen permit fires out of the total of nearly 12,000 escaped control and caused forest fires.

RAILWAYS.

Due to the effective enforcement of the fire-protection provisions of the Board of Railway Commissioners and of the Provincial Railway and Forest Acts, and to the favourable weather conditions, the fire hazard produced by the construction and operation of the railways in the Province during the past season has been well under control, and for the first time in many years no serious losses to timber or property have resulted from this source of danger.

DOMINION RAILWAYS.

The co-operative agreement between the Forest Branch and the Board of Railway Commissioners of Canada, described in my last report, by which the Branch has charge, outside the Railway Belt, of the local supervision and enforcement of the regulations of the Board and of the orders of the Chief Fire Inspector, has proven most satisfactory.

The railway companies which come within the jurisdiction of the Board are the Canadian Pacific Railway; Esquimalt & Nanaimo; Kettle Valley Railway; Kootenay Central; Great Northern; Vancouver, Victoria & Eastern; Nelson & Fort Sheppard; Morrissey, Fernie & Michel; and Grank Trunk Pacific.

All of these railways have carried out, in a manner satisfactory to the Board, regulations regarding fire-preventive devices on locomotives, the instruction and organization of the regular employees with respect to fire prevention and suppression, and the orders of the Chief Fire Inspector relative to the employment of special patrolmen in times of danger.

The railway officials showed themselves most anxious to do everything in their power to prevent and suppress fires, and the employees carried out their instructions conscientiously. As a result, the engines were, with very few exceptions, kept in prime order, the rights-of-way were placed in much better condition, care was exercised by the sectionmen and other track employees in the use of fire, and the fifty special patrolmen, by their constant patrol, effectively prevented any fires starting along the right-of-way from getting beyond control.

The District Foresters and Forest Rangers, who held appointments as Inspectors under the Board, kept in touch with the situation and assisted materially in keeping the importance of fire-prevention before the railway employees. They were also able, in times when the weather conditions rendered the danger of fires being set very small, to relieve the railways from the necessity for special patrol.

To indicate the serious fire hazard which the railways constitute, it is interesting to note that, despite the exceptionally favourable weather conditions and the great precautions taken to prevent fires, there were during the past season 110 fires caused by railway-locomotives. The effective patrol maintained by the railway companies was able, however, to keep all but a very few of these fires from spreading beyond the right-of-way, and practically no damage resulted.

Railways under construction constitute an even greater source of danger from fire than those under operation, and every effort was made to prevent a recurrence of the disastrous fires resulting from railway-construction last year. Arrangements were perfected with the Grand Trunk Pacific, Kootenay Central, and Kettle Valley Railways, by which the Forest Branch assumed complete control of the fire-protection organization, the expense of maintaining it being paid in whole or in part by the companies.

In all, thirty-six special patrolmen were employed to patrol the portions of railway under construction, and, while the danger was great during several short periods and twenty-eight fires started, none assumed dangerous proportions and the damage committed was nominal.

This excellent record and that of last year fully justifies the action of the Government in applying to the Board of Railway Commissioners for the adoption of regulations governing fire-prevention by railway companies. I wish to take this opportunity to express my high appreciation of the thorough and effective way in which the regulations are being enforced by the Chief Fire Inspector under the direction of the Board.

PROVINCIAL RAILWAYS.

The provisions of the Provincial Railway and Forest Acts with respect to the responsibility of the railway companies for the prevention and suppression of fires caused either by the operation or construction of railways under Provincial charter are, in effect, identical with the regulations adopted by the Board of Railway Commissioners for railways under Dominion charter.

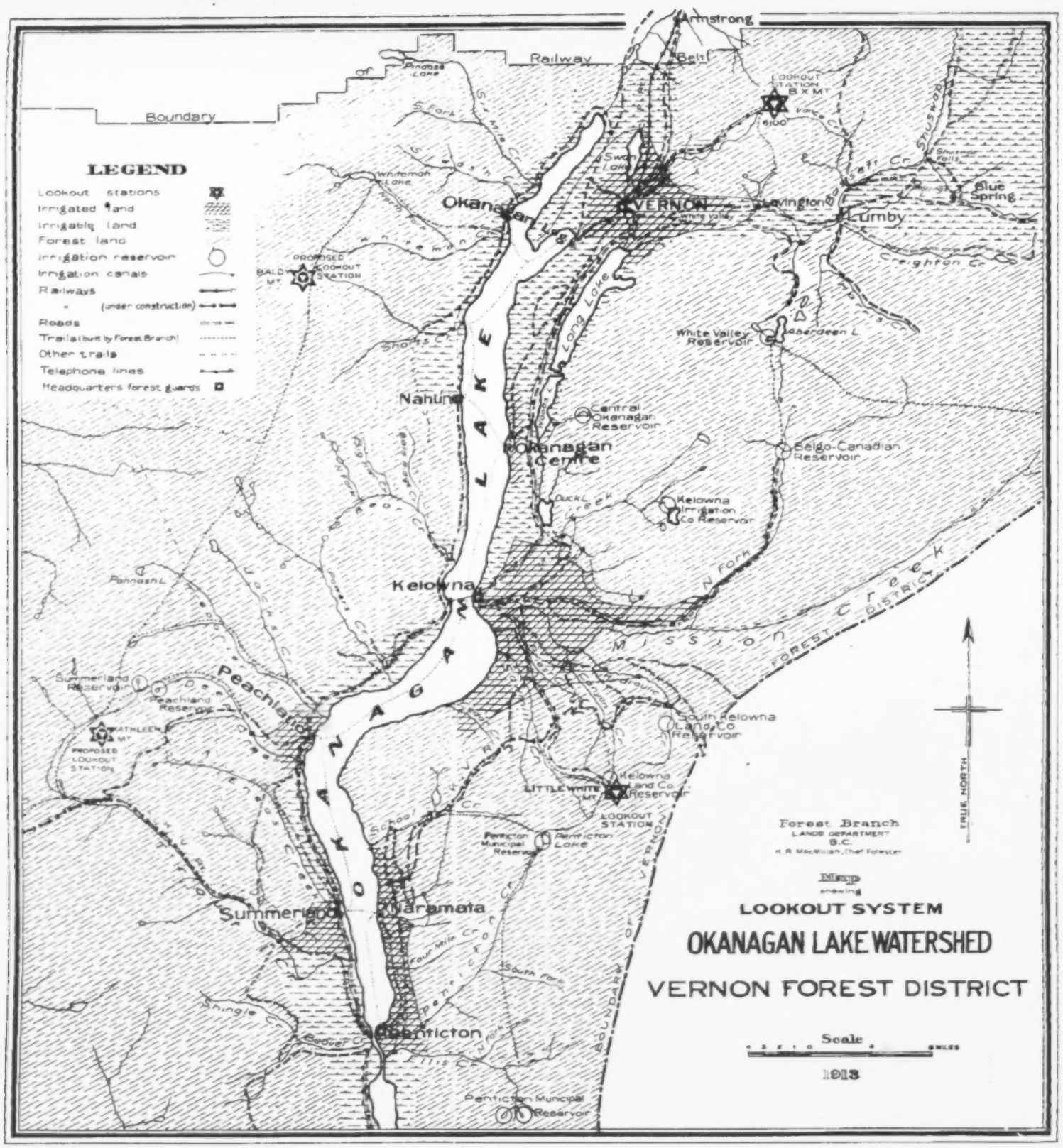
The railways under Provincial charter are the Canadian Northern Pacific Railway, the Pacific Great Eastern, and the Eastern British Columbia Railway. These railways are not as yet under operation except on small stretches, and the danger from fire is confined to construction-work. Under the "Forest Act" the responsibility for establishing a fire-protective force along such railways is placed on the Forest Branch, the cost of which, however, is borne by the railway companies. In all, thirty-eight patrolmen were employed by the Forest Branch for this purpose on these railways, and this number rendered possible a satisfactory patrol, so that no serious fires occurred, although thirty-four were reported. Besides patrolling for fire, the patrolmen supervised the clearing of the right-of-way. The District Foresters report that this work was well done, all the brush being piled and burned on the right-of-way, and no trees felled on to the land adjoining the right-of-way.

Construction-work will continue next year on all these railways, and patrolmen will be put on duty in the spring as soon as the fire hazard requires it. During the winter the clearing of the right-of-way is attended to by the Rangers.

DISTRICT PLANS.

The elements which enter into the problem of the protection from fire of immense areas of forest do not differ greatly from those which confront the problem of fire-protection in large cities. First in importance is the reduction of the fire hazard, which includes measures to prevent fires from being started, to confine fires that do start to as small an area as possible, and to minimize the damage which a fire may commit. These objects are attained by carefully drawn building regulations, by laying out the city with due regard to the fire-danger, and by the enforcement of rules with respect to the use of fire, electric wires, etc. Next comes the adoption of measures to extinguish fires which may start. This requires, first, an organization of firemen and the acquisition of means and equipment for fire-fighting, such as a dependable supply of water, hose, and pumping apparatus; and equipment for demolishing buildings, such as axes, dynamite, etc. Since, however, all fires are small at the start and the difficulty of suppression increases with tremendous rapidity, the greatest attention and effort is devoted to the perfection of means to get at the fire as quickly as possible after it is discovered. This resulted in the development of signal systems (which, however, have been largely superseded by the wide use of telephones) by which fires could be reported at headquarters immediately, no matter where located, and also by the development of rapid means of transportation, automobiles having recently replaced, to a great extent, horses. Time is so important an element, and the measures adopted to reach fires in the quickest possible time are so extreme and are carried out with such precision, that city fire departments are universally recognized as models of efficiency in the attainment of speed.

The problem of forest-protection, while subject to many widely different conditions, contains the same elements, and the plans for prevention and suppression of fires in forests must develop along the same lines as those of city fire departments. Each District Forester has had in preparation during the past season definite and detailed plans for the reduction of the fire hazard, the organization of an efficient force of patrolmen and fire-fighters, the distribution at points of vantage of fire-fighting equipment, and the perfection of the system of transportation and communication. The details of these plans will be carried out as rapidly as time and money


Armstrong
Railway
Boundary
Pinaboo Lake
Salmon R.
Swan Lake
Whitemans Lake
Okanagan Lake
VERNON
Lavington
Lumby
Blue Spring
Shuswap Falls
Shuswap R.
Creighton Cr.
Long Lake
White Valley Reservoir
Aberdeen L.
Nahun
Central Okanagan Reservoir
Okanagan Centre
Belgo-Canadian Reservoir
Kelowna Irrigation Co Reservoir
Duck L.
Kelowna
Penask L.
Mission Creek
Mission Creek Forest District
Summerland Reservoir
Peachland Reserve
Peachland
Summerland
Naramata
Penticton
Penticton Municipal Reservoir
Penticton Lake
Four Mile Cr.
South Fork
Shingle Cr.
Ellis Cr.
Boundary of Vernon
South Kelowna Land Co Reservoir
Kelowna Land Co Reservoir
LITTLE WHITE MT.
LOOKOUT STATION
BALDY MT.
PROPOSED LOOKOUT STATION
KATHLEEN MT.
PROPOSED LOOKOUT STATION
LOOKOUT STATION BX MT.
6100'
TRUE NORTH
LEGEND
Lookout stations
Irrigated land
Irrigable land
Forest land
Irrigation reservoir
Irrigation canals
Railways
(under construction)
Roads
Trails (built by Forest Branch)
Other trails
Telephone lines
Headquarters forest guards
Forest Branch
LANDS DEPARTMENT
B.C.
R. R. Mackillican, Chief Forester
Map
showing
LOOKOUT SYSTEM
OKANAGAN LAKE WATERSHED
VERNON FOREST DISTRICT
Scale
1913

permit, and another year will see a further decided advance in fire-protection methods. In some districts much has already been done, as will be shown by the reports and maps of the Okanagan Lake watershed and the Kootenay Valley, which follow.

REPORT ON FIRE-PROTECTION PLAN FOR OKANAGAN LAKE WATERSHED.

BY L. R. ANDREWS, DISTRICT FORESTER, VERNON FOREST DISTRICT.

Agriculture and fruit-growing are the leading industries in the Okanagan Valley. There are over 40,000 acres under irrigation, and as much again cleared and partly cultivated. In round numbers, from 25,000 to 30,000 people are dependent on the success or failure of the fruit-crops.

Fruit-growing has here reached its highest development in the Province. The bearing orchards in the vicinities of Vernon, Kelowna, Peachland, Summerland, Penticton, and the Southern Okanagan represent three-quarters of the total acreage producing fruit for market in British Columbia, and grow 70 per cent. of the fruit produced. Statistics of the past season's output of the Okanagan Valley show shipments of fruit and produce to the value of over $1,000,000, or $30 per head on the population of the valley.

As yet, only a beginning has been made, and the best and more easily handled locations developed, it being estimated that less than one-tenth of the lands suitable for agriculture have so far been touched.

Agriculture in general and fruit-growing in particular are dependent on irrigation, the rains in spring being hardly sufficient to start the crops. The dry season commences in late June or early July, and the high temperatures soon dry out the moisture in the ground, rendering artificial application of water absolutely necessary.

Private and municipal enterprise have invested from $4,000,000 to $5,000,000 in irrigation systems in the valley, and over 100 miles of flume and pipe-line have been built to serve the needs of the area now under cultivation and provide water for 40,000 acres of land. Practically all available flowing water, which can be taken by gravity from the ordinary flow of streams emptying into the Okanagan, has been utilized. At best, only a limited area can be supplied from this source; consequently the problem of the extension and development of irrigation for the large undeveloped tracts is one of very serious moment. Nowhere perhaps has nature provided more freely in the way of numerous streams and advantageous storage-basins for this purpose, but, even so, the most careful conservation and close utilization will have to be practised if water is to be provided for all the irrigable lands.

The experience of other countries has shown that the forest cover on mountain watersheds has a most important influence in conserving and maintaining the flow of water. It increases the storage-capacity of the soil, retards the spring thaw, and prevents excessively rapid run-off, and consequently lengthens and extends the period of maximum flow of streams.

The importance of establishing and maintaining adequate and efficient fire-protection, therefore, cannot be too greatly emphasized, since destruction of the forest cover would jeopardize an investment of millions of dollars and the means of support of thousands of people.

For the formation of a definite policy and plans for fire-protection, a careful study of conditions from a fire-protection point of view had to be made, and plans drawn up to fulfil local requirements. The topographical characteristics of the district naturally determine to a great extent the general plan of fire-protection, measures to be adopted, and the location of necessary improvements, such as trails, telephone-lines, look-out stations, Ranger stations, and tool caches.

Two outstanding features are noticeable from a glance at the map: (1) Long narrow valleys, the drainage-basins of the country; and (2) the vast areas intervening, the watersheds, and interior high levels.

In the valleys is centred the population of the district. Existing improvements, roads, trails, railroads, steamboat lines, telephone and telegraph communication, are located there, and in this comparatively small proportion of the whole area is found nearly all the economic activity of the district. The remainder and by far the greater area is very poorly supplied with communication facilities, is poorly, if at all, mapped, and is largely inaccessible. It is mostly too high in elevation to support much or varied enterprise, and is therefore uninhabited. These are the timbered watersheds on whose maintenance depend the water-supply for the irrigated land in the valleys.

Two sets of conditions are therefore presented. In the first instance is to be noted a zone of considerable fire hazard, in which, while fires are of frequent occurrence, means are present for their immediate control. In the second, a zone in which, while the danger of fires occurring is less, because of lack of population, the damage when fires do occur is much greater. It is in this latter region, therefore, that fire-protective measures must be concentrated if the watershed cover is to be maintained.

Protective measures for the first set have consisted of efforts to increase the efficiency and perfect the organization of the patrol force, systematizing and strengthening it so as to quickly and thoroughly cover the district in the shortest time; enforcement of the fire regulations regarding burning, so that no burning is done except under permit; preventive measures such as cleaning-up of bad slashings, frequent inspection of railway-engines and donkey-engines; and, lastly, in appeals to the general public for greater care in the use of fire. Every possible avenue for the quick reporting of fires was opened up, and means for getting men and supplies quickly to any given locality were carefully worked out in advance. Finally, where present means were lacking, new improvements were instituted for the better handling of the work. Trails were constructed connecting up existing roads to facilitate patrol.

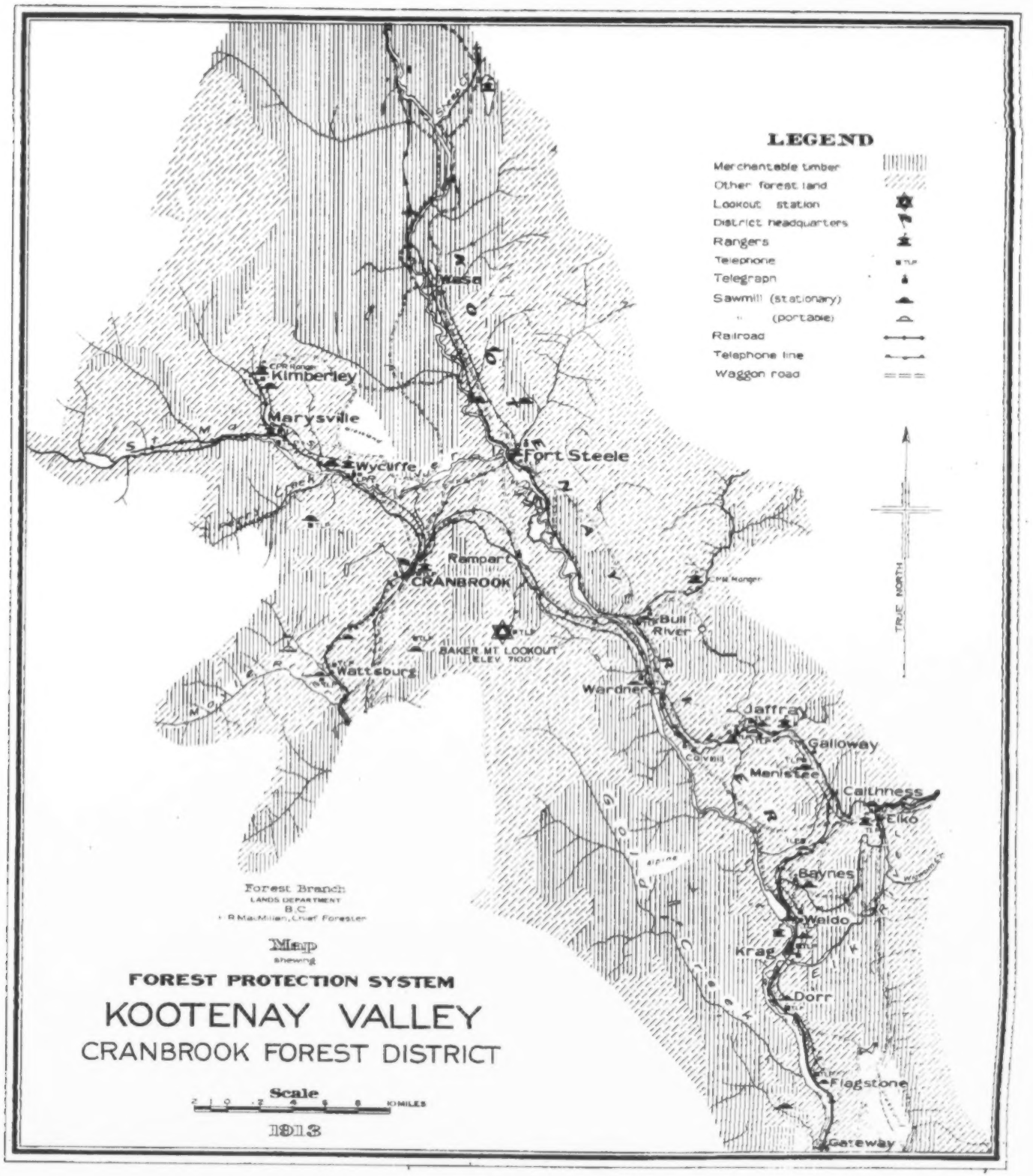
Intensive patrol organization is not practicable in the uninhabited and less accessible portions of the area, and the greatest difficulty is often experienced in locating and getting to fires while they are small and easily handled. Fires are not seen till they have reached a considerable size, and there are few transportation facilities for getting to them. Therefore, in instituting protective measures, new improvements were essential for the handling of the work. These have taken two forms: (1) For the detection and location of fires, mountain-peaks with elevation of from 6,000 to 7,000 feet were located as look-out stations to cover the entire district, and, where possible, close enough to provide double look-out patrol for the whole country, and situated to command the reservoirs of the principle irrigation systems; (2) for general patrol and for reaching and fighting fires, a system of main trails and branch trails was planned and constructed.

The two look-out stations were established on the east side of the Okanagan, and during the past season were connected to the commercial centres by twenty-four miles of telephone-lines built by the Forest Branch. One is situated on Little White Mountain, thirty-nine miles south-east of Kelowna, on the apex of the watersheds of the S.K.L., K.L.O., and Penticton Municipality irrigation systems, and within a few miles of their reservoirs. The second was established on B.X. Mountain, eighteen miles out of Vernon, on the watershed of the Vernon City, Armstrong City, and Coldstream Municipal domestic-supply systems, and overlooking the White Valley irrigation reservoir and watershed. These points can each be seen one from the other, so that a double patrol of the whole area is effected.

The stations are connected by main trails along the divide, fifty miles of which was constructed and joined up this year by the Forest Branch. These main trails were located along the heights of land on the watersheds to be protected, so that the patrolman can overlook the country, and also so that later these trails may be widened to constitute fire-breaks along the divide. In addition, twenty miles of branch trails were constructed and opened up, so that now the heretofore inaccessible regions can be reached for fire-protection.

On the west side of the Okanagan two look-out stations are proposed, and will probably be constructed early next summer. One is situated on Kathleen Mountain, on the divide between the Okanagan and the Nicola. It overlooks the reservoirs of the Summerland municipal and Peachland irrigation reservoirs. The second is on Baldy Mountain, at the headwaters of Whiteman's and Short's Creeks. Seventy-five miles of trail and tree telephone-line will be required to connect these and join them to the main system.

Seven patrol divisions were established in the Okanagan Valley at the beginning of the last season, and in each men were put on and patrol routes laid out for the comprehensive covering of the whole in a systematic manner. By the look-out system established, the whole Vernon District is commanded and the work unified by look-out control. Each patrolman is required to report once per day by telephone to the look-out commanding his division at the end of each section of his patrol beat, or as near as facilities permit. Thus a man on a look-out station commanding two or three patrol divisions keeps in touch with the patrols and is aware at any one time of the whereabouts of each Guard. The look-outs in turn report daily to the Ranger headquarters, and a complete system of co-operation is made possible.


LEGEND
Merchantable timber
Other forest land
Lookout station
District headquarters
Rangers
Telephone
Telegraph
Sawmill (stationary)
(portable)
Railroad
Telephone line
Waggon road
TRUE NORTH
Kimberley
Marysville
Wycurre
Fort Steele
Rampart
CRANBROOK
BAKER MT. LOOKOUT
ELEV. 7100'
Wattsburg
Bull River
Wardner
Jaffray
Galloway
Meniss Lee
Calthness
Elko
Baynes
Waldo
Krag
Dorr
Flagstone
Gateway
Forest Branch
LANDS DEPARTMENT
B.C.
R. MacMillan, Chief Forester
Map
shewing
FOREST PROTECTION SYSTEM
KOOTENAY VALLEY
CRANBROOK FOREST DISTRICT
Scale
10 MILES
1913

In case of fire, when smoke is discovered by a look-out it is immediately reported to the District Forest Office at Vernon. The direction and location of the fire from the look-out station is given, the direction and velocity of the wind, and the whereabouts of the Guard in whose district the fire is situated. On a chart map in the district office the position of the fire is checked up, and the Guard immediately notified to proceed to the nearest point to the fire from which connecting trails run to the Interior, and where men and supplies can be gathered. By the time the Guard reaches this point telephone messages have made arrangements in advance for supplies, equipment, and a crew of three to five men. The Guard organizes his crew and proceeds to the fire. If the fire is reported a big one, and the velocity of the wind considerable, a second crew may be organized while the first is still on the way, and held in reserve. Reports from the look-out keep the head office informed as to the progress of the fire, and if in a reasonable time satisfactory control of the fire does not seem to have been effected by the first crew, these reinforcements are forwarded.

For increasing the efficiency and speed in collecting men and supplies, information as to the location of crews of Government roadmen, logging operations, and other work going on in the district is carefully collected and tabulated in the district office. Co-operation with storekeepers in the different centres is arranged for also, so that necessary supplies will be kept in stock.

During the past season, while the above plans were in the making, opportunities were afforded for testing and predicting its efficiency and for the working-out of details. Actual results in handling twenty-five fires, while very encouraging, served mainly to direct and stimulate further efforts.

Co-operation with those vitally interested and with the general public has yet to be worked out and elaborated. On this, in the final analysis, depends ultimate success or failure. I am confident that with the spread and more general application of the importance of fire-protection in this district, efficient protection will be established in the near future.

A map showing the conditions in the Okanagan Valley described in this report is transmitted herewith.

REPORT ON MOUNT BAKER LOOK-OUT STATION.

By J. D. GILMOUR, District Forester, Cranbrook Forest District.

A noteworthy feature in the improvements built by the Provincial Forest Branch during 1913 and designed to assist materially in fire-protection in the Cranbrook Forest District is the Baker Mountain Look-out Station, including a telephone-line built to connect it with the remainder of the fire-patrol service. An elevation of 7,100 feet above sea-level is attained on this summit, and an area of 1,859 square miles (1,184,000 acres) is commanded from it. The situation of Baker Mountain is peculiarly favourable for its use as a look-out point. It is a rounded cone-shaped peak of volcanic origin undoubtedly, occupying a striking position detached from any other considerable elevation. It rises from an uneven plain of elevations varying between 2,500 and 3,000 feet above sea-level, which surrounds it for many miles. The main valley is that of the Kootenay River, which flows in the direction, roughly, S. 20° E., and may be seen from Baker Mountain for nearly the whole of the eighty miles of the Kootenay River which lie between Canal Flats and the International Boundary. The view from Baker Mountain includes practically all the valley lying between the Rockies and the Selkirks from Canal Flats to the boundary. This area is drained by the Kootenay River and by the following tributaries: Sheep, Skookumchuck, and Findlay Creeks, St. Mary's River, Perry, Cherry, and Wild Horse Creeks, and Bull River, as well as Gold Creek, the Lower Elk and Moyie Rivers.

Within this area there operated in 1913 twenty-three sawmills and three planing-mills, which were separated from the sawmills, in addition to all the logging camps and operations in connection. These mills, when operated simultaneously, have a combined daily capacity (ten hours) of 760,000 feet. The smoke from these plants is easily seen, and the various plants distinguished from each other from the look-out point; and during the dangerous season it was noticed that the air is normally sufficiently clear to enable this to be done.

The system is designed to be used in conjunction with the regular or slightly modified patrol force. During the dry months a man with a good knowledge of the country will spend every day on top of the mountain. He will be provided with field-glasses, a good map of the territory

which he can see, and a compass. He has direct communication with the district office of the Forest Branch by telephone, the telephone instrument being on the extreme summit. The look-out proved its usefulness during construction; before telephone communication was completed, the telephone gang while working at an elevation of only 4,500 feet saw a bush fire about eight miles away. By riding three miles to Rampart, the nearest telegraph-office, notice was sent to Cranbrook. The fire was under control that night, and otherwise would not have been reported to the Forest Branch until the succeeding morning, as it occurred in an isolated place. With telephone connection such a notice can be sent much more rapidly and the exact position of the fire more fully described by the look-out man than by telegraph. At the present time the ordinary Forest Guard has to travel—when the weather in favourable—to look after the granting of permits to burn; in dry, dangerous times he must continuously patrol in most dangerous parts of his district on the look-out for fires. A tremendous amount of travel is thus involved, while his chances of discovering fires at the earliest time, and while it may be easily controlled, are small. If news of a fire anywhere in the district could be quickly obtained, means could be taken to handle it to the best advantage. It is confidently expected that the look-out will enable immediate notice of a fire to be received. The look-out man will be familiar with the normal smoke columns within his range of sight, and any abnormal one will be easily detected. The system will have to include the notification of the patrolman of permits issued, else he would report fires which are normal. It is possible to distinguish a very small fire; even a camp-fire might be distinguished at ten miles on a clear day. Any considerable body of smoke can be seen at thirty miles, or even farther in some cases.

The look-out system is part of an intensive fire-protective organization; it can, however, be treated as a system to give as good or a little better service than is had at present. It will allow of fewer Forest Guards, and there will be less necessity for the large amount of aimless travel which the ordinary method of fire patrol involves.

In dry times a regular round for each Forest Guard will be worked out in order that his whereabouts each day shall be known, so that he can be reached promptly by telephone or telegraph.

Another advantage will be in determining the number of extra men required in fire-fighting, with greater accuracy than at present. Extra expense often is incurred through taking more men than are necessary to fight certain fires. The look-out man should be able to gauge the extent of a fire, and thus plans can be made with greater intelligence and efficiency and less cost.

From personal observations and experience thus far, I am convinced that the Baker Mountain Look-out Station is a good investment, and the cost is trifling when we consider its value in protecting the timber on such a large area. It is estimated that on the area which can be seen or controlled from this point there is standing at the present time 4,000,000,000 feet of merchantable timber, worth at least $4,000,000 as raw material, and over $40,000,000 when manufactured.

It is confidently expected that the first bad fire season will demonstrate its advantages.

PERMANENT IMPROVEMENTS.

The favourable weather conditions during the fire season and the effective and economical manner in which the field force handled the fires which did occur made available for improvement-work a much larger fund than was counted on, and as a result an unexpectedly large amount of improvement-work was completed. In all, nearly 1,200 miles of trail, 360 miles of telephone-line, and ten cabins were constructed. It was not felt to be advisable to incur any considerable liability for improvement-work until the season of great danger from fires had passed, and only a few very important projects were started before the middle of August. By that time it was evident that there was little probability of extensive fires occurring, and the fund set aside for fire-fighting was devoted to improvement-work.

Great care was exercised in the selection of projects, so that the money available would be devoted only to those which were essential to efficient fire-protection, and also to avoid taking up projects which might be constructed by private enterprise, or which lay within the province of the Public Works Department.

Every effort was made to reduce the cost of projects to the minimum, and the method or standard of construction adopted was made to fit the particular conditions surrounding each project.

FOREST BRANCH

PERMANENT IMPROVEMENTS

(Constructed by B. C. Forest Branch, 1913)

REPORT 1913

DRAWN BY GEOGRAPHIC BRANCH SURVEYOR-GENERAL'S OFFICE

In general, trails are built to provide means for patrol, to render easily accessible, in case of fire, merchantable tracts of timber, and to reach look-out stations.

The principal object to be gained by the construction of telephone-lines is the improvement in facilities for reporting fires quickly, and to direct the handling of fires. While the telephone-lines are considered purely and simply fire-protective equipment, they are opened to limited use by settlers, miners, logging operators, and the public where such service will not interfere with its use for fire-protection work. In many cases, of course, great assistance in reporting fires is obtained by the installation of telephones in such places. No lines are constructed where it is thought the conditions justify commercial telephone-lines, and only nominal charges for service are made.

Cabins are usually erected for the shelter of patrolmen in localities distant from settlement, although occasionally a headquarters cabin for use by Rangers must be built.

On the Coast and on the navigable waters of the Interior, water transportation frequently affords the only means for travel, and launches, rowboats, and canoes are provided where established commercial lines of water transportation will not answer the purpose. The Branch now owns and is using three launches 50 feet or more in length, six launches 35 to 40 feet in length, eleven launches under 30 feet in length, and twenty canoes, dug-outs, and rowboats. Outside four small launches which are on Kootenay, Arrow, Mable, and Quesnel Lakes, these launches are all in coastal waters. A number of small launches, canoes, and rowboats are needed and several 30-foot launches, but when these are supplied the Branch will be equipped for a number of years.

The following table shows the total amount of improvement-work completed and the number of boats purchased during the year, together with the cost:—

PERMANENT IMPROVEMENTS CONSTRUCTED BY THE FOREST BRANCH, 1913, CLASSIFIED BY KIND, NUMBER, AMOUNT, AND COST.

Kind of Improvement.	Number.	Miles.	Total Cost.	Cost per Mile or Unit.
Horse-trails	69	1,015	$37,192 73	$36 64
Foot-trails	18	168	4,135 09	24 02
Bridges	2	....	100 00	50 00
Telephone-lines	12	360	22,248 39	61 80
Launches, boats, and canoes	36	....	33,300 00	....
Boat-houses	5	....	1,666 30	333 26
Cabins	10	....	1,899 95	190 00
Totals	146	....	100,542 48	.....

There is attached a map giving the approximate location of the various improvement projects, which are briefly described in the list which follows:—

LIST OF PERMANENT IMPROVEMENT PROJECTS (KEY TO MAP).

Cranbrook District.

1. Elk River Telephone-line, 45 miles completed.
2. Mount Baker Look-out Station and Cabin, 6 miles of trail and 6 miles of telephone-line.
3. Goat Mount Look-out Station and Cabin, 3½ miles of trail and 3 miles of telephone-line.
4. Upper Kootenay River Horse-trail, 43½ miles completed.
5. Corn Creek Horse-trail, 14 miles completed.
6. Lodgepole Creek-Flathead River Horse-trail, 42 miles completed.
7. Russell Creek Horse-trail, 14 miles completed.
8. Phillips-Couldrey Creek Horse-trail, 16½ miles completed; to be extended 18½ miles.

Fort George District.

1. Rowboat with Evinrude Motor for Quesnel Lake.
3. Pilot Mountain Look-out Station and Trail, 1 mile of trail.
7. Bear River Horse-trail, 16 miles completed.
8. North Fork Fraser River Horse-trail, 5 miles completed.
9. Blackwater River Ranger Station Cabin.
10. Canoe Cache, Bednesti Lake.

11. Cottonwood Stony Lake Horse-trail, 16 miles completed.
13. Portage, Bednesti-Chucolz Lakes, 2 miles of trail.
14. Willow River Horse-trail, 12 miles completed.
15. Blackwater-Fraser River Horse-trail (rebuilt), 15 miles.
16. Trail to T.L. 504, L. 4223, 3 miles (foot-trail).
17. Beaver Lake to Antoine Lake Horse-trail (repair), 10 miles.
18. Round Mountain Look-out Station and Trail, ½ mile.

Hazelton District.

1. Breckenridge-Coldwater Creek Horse-trail, 9 miles.
2. Kitsumgallum Look-out Station and Foot-trail, 1½ miles.
3. Lakelse Lake Look-out Station and Foot-trail, 1½ miles.
4. Zymoetz River-Mud Lake Horse-trail, 10 miles.
5. Kitwancool Ranger Station Cabin.
7. Canoe, Ootsa Lake.
8. Copper River Ranger Station Cabin.
9. Bear River Ranger Station Cabin.
10. Terrace-Lakelse Lake Telephone-line, 17 miles.
11. Mud Lake Ranger Station Cabin.
12. Kitsumgallum Lake Boat-house.

Island District.

1. Launch, Cowichan Lake.
3. San Juan River Horse-trail, 15½ miles completed; to be extended 20 miles.
4. Gordon River-Cowichan Lake Horse-trail, 4½ miles.
6. Sarita River Horse-trail, 6¼ miles.

Kamloops District.

1. Big Bend Telephone-line, 62 miles completed; 29 miles paid for by Dominion Forestry Branch; to be extended 85 miles.
2. Humamilt Lake Boat.
4. Vavenby-Barriere Lake Horse-trail, 19½ miles completed; to be extended 10 miles.
5. Adams River-North Thompson River Horse-trail, 15 miles.
6. North Thompson-Columbia Horse-trail, 18 miles.
7. Lemieux Creek-Mahood Lake Horse-trail, 21 miles completed; to be extended 4 miles.
8. Adams Lake-Seymour Arm Horse-trail, 26 miles.
9. Louis Creek-Barriere Horse-trail, 3 miles.
10. Mount Olie-Clearwater Horse-trail, 17 miles.
12. Goldstream Ranger Station Cabin.
15. Barriere River-Squam Bay Horse-trail, 4 miles completed; to be extended 9 miles.
16. Adams Lake-North Barriere Horse-trail, 18 miles completed; to be extended 12 miles
18. 13-Mile Ranger Station Cabin.

Lillooet District.

1. Anderson-Blackwater Lakes Horse-trail, 12 miles.
2. Blackwater Lake Canoe.
3. 70-Mile House-Jameson's Place (Loon Lake), 10 miles.

Nelson District.

1. Fire Patrol Launch, Kootenay Lake.
2. Fire Patrol Launch, Arrow Lake.
3. Kettle River Telephone-line, 27½ miles completed; to be extended 16 miles.
4. Duncan River Telephone-line, 40 miles completed; to be extended 8 miles.
6. Nakusp Boat-house for the Arrow Lake Launch.
7. Davis Creek Foot-trails (two), 9 miles.
8. East Creek Foot-trail, 7½ miles.
10. Mosquito Creek-Whatshan Lake Horse-trail, 3 miles completed; to be extended 3 miles.
11. Mosquito Creek Horse-trail, 6 miles.
12. Wilson Creek Horse-trail, 7 miles completed; to be extended 5 miles.
14. West Fork of Dog Creek Horse-trail, 14 miles completed; to be extended 14 miles.
15. Arrow Lake-Shield's Station Horse-trail, 4½ miles.
16. East side Columbia River Horse-trail, 15 miles.
17. Boulder Creek Horse-trail, 4 miles.
18. East Fork of North Fork Salmon River Horse-trail, 2 miles.
19. Fruitvale-Nine-mile Creek Horse-trail, 6 miles.
21. Granite Creek Horse-trail, 2½ miles.
22. Mount Donaldson Look-out Station, cabin built, wire strung, and telephones.

23. Erie-Second Relief Mine Telephone-line. 14 miles (to be installed next year). Expense shared between Second Relief Mine, Clarkson Estate, and Forest Branch.
24. Peter Creek-Bulldog Tunnel Horse-trail, 4 miles.
25. Boulder-Stevens Creek Horse-trail, 5 miles.
27. Poplar-Hope Creek Horse-trail (repaired), 4 miles.
30. Graham Creek Horse-trail, 7 miles completed; to be extended 3 miles.
33. Cedar Creek-Christiana Lake Horse-trail, 4 miles.
35. Hall Creek Bridge (repaired) on Duncan River Trail.
37. Stevens Creek Bridge (repaired) on Duncan River Trail.

Tete Jaune Cache District.

2. Goat River Ranger Station and Cabins.
3. Beaver River Horse-trail, 14 miles.
5. Cranberry Lake-Log jam (Canoe River) Trail, 25 miles.
10. Cottonwood River Horse-trail, 6½ miles.
11. La Salle Creek Horse-trail, 3 miles.

Vancouver District.

1-4. Launches for Patrol (6).
5. Heriot Bay Telephone-line, 52 miles.
6. Acteon Sound-Seymour Inlet Foot-trail, 3 miles.
7. Bond Sound-Kingcome Inlet Foot-trail, 4 miles.
9. Estero Basin-Bute Inlet Foot-trail, 2 miles.
10. Forward Harbour-Beaver Creek Foot-trail, 3½ miles.
11. Gordon Pasha-Powell Lakes Foot-trail, 15 miles.
12. Gordon Pasha-St. Vincent Bay Foot-trail, 4 miles.
13. Indian River-Mamquam River Foot-trail, 48 miles.
14. Jackson Bay-Glendale Cove Foot-trail, 15 miles.
15. Lillooet River-Pemberton Meadows Horse-trail, 30 miles.
18. Port Neville-Call Creek Foot-trail, 5 miles.
19. Rainy Creek-Salmon Arm Foot-trail, 13 miles.
20. Stave-Harrison Lakes Foot-trail, 25 miles completed; to be extended 6 miles.
22. Campbell-Salmon River Horse-trail, 48 miles completed; to be extended 7 miles.
23. Shoal Bay Ranger Station and Float for Launches.
25. Malaspina Inlet-Theodosia River Foot-trail, 21 miles.
26. Chilliwack River Horse-trail. Built in co-operation with Dominion Timber Branch.
27. Heriot Bay Ranger Station and Float for Launches.

Vernon District.

1. B.X. Mountain Look-out Station, 18½ miles of telephone-line and 6 miles of trail.
2. White Mountain Look-out Station, 6 miles of telephone-line and trail.
3. Launch with Evinrude Motor for Mabel Lake.
4. Aberdeen-Fish Hawk Horse-trail, 32 miles.
6. Ellis-Penticton Creek Horse-trail, 3½ miles completed; to be extended 5 miles.
7. Penticton Dam-K.V. Railway Horse-trail, 12 miles.
8. Saunders Ranch-Mabel Lake Horse-trail, 4 miles.
10. Trout to Jack's Creek Horse-trail, 18 miles.
11. White Mountain-Penticton Dam Horse-trail, 4½ miles.
13. Whiteman's Lake-Bear Creek Horse-trail, 6 miles completed; to be extended 30 miles.
14. Sawmill Creek-Little White Mountain Look-out Station Horse-trail, 6 miles.
15. Hope-Cambie Creek Horse-trail, 5 miles completed; to be extended 10 miles.
16. Cedar Creek-Cambie Creek Horse-trail, 20 miles.
17. Trepannier Creek-Main Trail, 11 miles.
18. Aberdeen Lake-Belgo Dam Trail, 8 miles.
19. Lavington-B.X. Mountain Look-out Trail, 9 miles.
21. Deep Creek-Main Trail, 9 miles.

I have the honour to be,
Sir,
Your obedient servant,

H. R. MACMILLAN,
Chief Forester.